

Cyclic Aliphatic Bromides Cluster (HBCD)
(CASRN: 25637-99-4; 3194-55-6; 3194-57-8)

**Systematic Review Supplemental File for the TSCA Risk
Evaluation: Data Quality Evaluation for Occupational Exposure
and Release Data**

Release

Study Citation:	Kemmlein, S.,Hahn, O.,Jann, O.. 2003. Emissions of organophosphate and brominated flame retardants from selected consumer products and building materials. Atmospheric Environment.				
Data Type	Release; Commercial Use; Insulation products in buildings; Environmental Release Data;				
Hero ID	131377				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Represents release in a chamber and may not be fully representative of the circumstances during actual use	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Germany	
Metric 3:	Applicability	Acceptable	3	Occupational scenario (use of insulation in offices).	
Metric 4:	Temporal Representativeness	Acceptable	3	2003	
Metric 5:	Sample Size	Acceptable	3	There are two insulation samples with four test results - is cahracterized but may not be representative	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Release circumstances are fully characterized	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Discusses how sample type, chamber temperature, and chamber size may affect results	
Overall Quality Determination*		High	1.6		
Extracted		Yes			
Parameter		EXTRACTION Data			
Release Source:		Emission from EPS and XPS insulation samples from manufacturers, measured in chamber tests			
Environmental Media:		Air			
Release or Emission Factor:		See table 5. Emission is ng of HBCD per m2 of insulation per hour. EPS = 4 ng/m2-h and 1 ng/m2-h. XPS = 29 ng/m2-h and 0.1 ng/m2-h.			
Release Estimation Method:		Measured			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	ToxNet Hazardous Substances Data, Bank. 2017. HSDB: Hexabromocyclododecane.				
Data Type	Release; All; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3970277				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	US	
Metric 3:	Applicability	Acceptable	3	Captures releases from all possible stages, some of which are not in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2001	
Metric 5:	Sample Size	Unacceptable	4	Sample size not listed, just cites the National Sewage Sludge Survey	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	The report does not address variability or uncertainty with respect to this data element.	
Overall Quality Determination *		Medium	1.9		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Release Source:		HBCD in sewage sludge from EPA’s 2001 National Sewage Sludge Survey			
Disposal /Treatment Method:		Sewage sludge to Biosolids, land applications, incineration, landfill			
Environmental Media:		Water, Land			
Release Estimation Method:		Measured			
Annual Release Quantity (kg/yr):		101-127 kg/yr to biosolids; 49.9-75.9 to land application; 20.8-26 to incineration; 17.7-20.9 kg/yr to landfill			
Waste Treatment Method:		Sewage sludge to Biosolids, land applications, incineration, landfill			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Nicnas,. 2012. Priority existing chemical assessments: Hyexabromocyclododecane (HBCD)- PEC34.			
Data Type	Release; Processing; EPS / XPS Compounding and converting; Completed Exposure or Risk Assessments;			
Hero ID	3978355			
Domain	Metric	Rating	Score	Comments
Domain 1: Reliability				
Metric 1:	Methodology	Acceptable	3	Information is from 2004 Plastics Compounding and Converting ESD
Domain 2: Representative				
Metric 2:	Geographic Scope	Acceptable	3	OECD
Metric 3:	Applicability	Acceptable	3	EPS compounding not in scope, but other scenarios are
Metric 4:	Temporal Representativeness	Acceptable	3	2004
Metric 5:	Sample Size	Unacceptable	4	Unknown
Domain 3: Accessibility/Clarity				
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited
Domain 4: Variability and Uncertainty				
Metric 7:	Metadata Completeness	Acceptable	3	Limited discussion on uncertainty and variability
Overall Quality Determination*		Medium	1.9	
Extracted		Yes		
EXTRACTION				
Parameter		Data		
Environmental Media:		Water, Land, Air, Incineration		
Release or Emission Factor:		Loss fractions cited from the 2004 Plastics Compounding and Converting ESD		
Release Estimation Method:		Estimated		
Release Days per Year:		2004 Plastics Compounding and Converting ESD		
Number of Sites:		2004 Plastics Compounding and Converting ESD		

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Nicnas,. 2012. Priority existing chemical assessments: Hyexabromocyclododecane (HBCD)- PEC34.				
Data Type	Release; Commercial Use; Insulation products in buildings; Completed Exposure or Risk Assessments;				
Hero ID	3978355				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Australia	
Metric 3:	Applicability	Acceptable	3	Occupational scenario (use of insulation in offices).	
Metric 4:	Temporal Representativeness	Acceptable	3	2012	
Metric 5:	Sample Size	Unacceptable	4	Unknown	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Discusses variability and uncertainty	
Overall Quality Determination*		High	1.3		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Release Source:		Life of EPS /XPS insulation			
Environmental Media:		Air and water			
Release Estimation Method:		Estimated			
Annual Release Quantity (kg/yr):		1.4 (Air) and 1.4 (Water)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	. 2014. The 2012 annual effluent guidelines review report.			
Data Type	Release; All; Reports for Data or Information Other than Exposure or Release Data;			
Hero ID	3860559			
Domain	Metric	Rating	Score	Comments
Domain 1: Reliability				
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources
Domain 2: Representative				
Metric 2:	Geographic Scope	Acceptable	3	EU
Metric 3:	Applicability	Acceptable	3	Captures releases from all possible stages, some of which are not in scope
Metric 4:	Temporal Representativeness	Acceptable	3	2008
Metric 5:	Sample Size	Unacceptable	4	Information stated from Europe, unknown sample size
Domain 3: Accessibility/Clarity				
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited
Domain 4: Variability and Uncertainty				
Metric 7:	Metadata Completeness	Acceptable	3	Discusses variability and uncertainty with regards to limitations on how European data can be applied to US
Overall Quality Determination *		High	1.6	
Extracted		Yes		
EXTRACTION				
Parameter		Data		
Release Source:		Data from the United Kingdom indicate that the primary sources of HBCD release are fugitive emissions during its manufacture and subsequent use in products, leaching from landfills, and incinerator emissions		
Environmental Media:		50 percent to WWT, 29 percent surface water, 21 percent air		
Release Estimation Method:		Measured		
Annual Release Quantity (kg/yr):		3100		

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2008. Risk assessment: hexabromocyclododecane.				
Data Type	Release; Disposal; Insulation products in buildings; Completed Exposure or Risk Assessments;				
Hero ID	3970747				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability	Metric 1: Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative	Metric 2: Geographic Scope	Acceptable	3	Europe	
	Metric 3: Applicability	Acceptable	3	In scope	
	Metric 4: Temporal Representativeness	Unacceptable	4	1992	
	Metric 5: Sample Size	Unacceptable	4	Distribution characterized by no statistics.	
Domain 3: Accessibility/Clarity	Metric 6: Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		Medium	1.8		
Extracted		Yes			
Parameter		EXTRACTION Data			
Release Source:		Building and construction waste			
Release or Emission Factor:		Information from industry shows that, in 1992, out of the total construction- and demolition (C&D) waste, plastic waste was 0.4 percent of the weight. EPS and XPS were representing about 3 percent of the plastic waste and therefore 0.01 percent of the total building waste.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2008. Risk assessment: hexabromocyclododecane.				
Data Type	Release; Processing; Formulation of EPS and HIPS; Completed Exposure or Risk Assessments;				
Hero ID	3970747				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	HIPS similar but not in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Acceptable	3	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.3		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Environmental Media:		WW, surface water, air			
Release Estimation Method:		Measured			
Annual Release Quantity (kg/yr):		Table 3-5 = 0.3 to 113.4 (surface water); 0.14 to 20 (WW); 0.029 to 2.2 (air)			
Release Days per Year:		1 to 340			
Number of Sites:		13			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2008. Risk assessment: hexabromocyclododecane.				
Data Type	Release; Processing; Formulation of EPS and HIPS; Completed Exposure or Risk Assessments;				
Hero ID	3970747				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	HIPS similar but not in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Acceptable	3	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.3		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Environmental Media:		WW, surface water, air			
Release Estimation Method:		Estimated for sites that did not provide data using the 90th percentile of measured values from sites that did provide data			
Annual Release Quantity (kg/yr):		Table 3-6 = 22.8 (surface water), 2.2 (air)			
Release Days per Year:		300			
Number of Sites:		6			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2008. Risk assessment: hexabromocyclododecane.				
Data Type	Release; Processing; XPS Compounding / Masterbatch; Completed Exposure or Risk Assessments;				
Hero ID	3970747				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Use is in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Acceptable	3	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.1		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Environmental Media:		surface water, air			
Release Estimation Method:		Measured			
Annual Release Quantity (kg/yr):		Table 3-9 = 0.12 to 37 (WW) and 1.2 to 3.3 (air)			
Release Days per Year:		300			
Number of Sites:		3			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2008. Risk assessment: hexabromocyclododecane.				
Data Type	Release; Processing; XPS Compounding / Masterbatch; Completed Exposure or Risk Assessments;				
Hero ID	3970747				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Use is in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Acceptable	3	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.1		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Environmental Media:		surface water, air			
Release Estimation Method:		Estimated for sites that did not provide data using the 90th percentile of measured values from sites that did provide data			
Annual Release Quantity (kg/yr):		Table 3-10 = 26 (WW), 2.6 (air)			
Release Days per Year:		300			
Number of Sites:		11			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2008. Risk assessment: hexabromocyclododecane.				
Data Type	Release; Processing; EPS Converting; Completed Exposure or Risk Assessments;				
Hero ID	3970747				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Use is in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Unacceptable	4	Distribution of samples characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination *		High	1.3		
Extracted		Yes			
Parameter		EXTRACTION Data			
Environmental Media:		WW, surface water, air			
Release Estimation Method:		Estimated			
Annual Release Quantity (kg/yr):		Table 3-16 = 20.4 (surface water), 82 (WW), 102 (Air)			
Release Days per Year:		Table 3-5			
Number of Sites:		hundreds			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2008. Risk assessment: hexabromocyclododecane.				
Data Type	Release; Processing; XPS converting; Completed Exposure or Risk Assessments;				
Hero ID	3970747				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Use is in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Acceptable	3	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.1		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Environmental Media:		WW, air			
Release Estimation Method:		Measured			
Annual Release Quantity (kg/yr):		Table 3-19 = 0 to 4.2 (WW), 0.31 to 18 (air)			
Release Days per Year:		15 to 300			
Number of Sites:		4			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2008. Risk assessment: hexabromocyclododecane.				
Data Type	Release; Processing; XPS converting; Completed Exposure or Risk Assessments;				
Hero ID	3970747				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Use is in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Acceptable	3	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination *		High	1.1		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Environmental Media:		WW, air			
Release Estimation Method:		Estimated for sites that did not provide data using the 90th percentile of measured values from sites that did provide data			
Annual Release Quantity (kg/yr):		Table 3-20 = 7.9 (WW), 17.4 (air)			
Number of Sites:		13			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2008. Risk assessment: hexabromocyclododecane.				
Data Type	Release; Commercial Use; Insulation products in buildings; Completed Exposure or Risk Assessments;				
Hero ID	3970747				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Occupational scenario (use of insulation in offices).	
Metric 4:	Temporal Representativeness	Acceptable	3	sources date back to 2002	
Metric 5:	Sample Size	Unacceptable	4	Distribution characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.6		
Extracted		Yes			
Parameter		EXTRACTION Data			
Environmental Media:		surface water, WW, air			
Release or Emission Factor:		release factor = 8.4E-06			
Release Estimation Method:		estimates taken from sources			
Annual Release Quantity (kg/yr):		Table 3-33 = 54 (air), 0 (surface water and WW)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2008. Risk assessment: hexabromocyclododecane.				
Data Type	Release; Disposal; Insulation products in buildings; Completed Exposure or Risk Assessments;				
Hero ID	3970747				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability	Metric 1: Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative	Metric 2: Geographic Scope	Acceptable	3	Europe	
	Metric 3: Applicability	Acceptable	3	Use is in scope	
	Metric 4: Temporal Representativeness	Acceptable	3	2008	
	Metric 5: Sample Size	Unacceptable	4	Distribution characterized by no statistics.	
Domain 3: Accessibility/Clarity	Metric 6: Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.3		
Extracted		Yes			
Parameter		EXTRACTION Data			
Release Source:		demolotion of buildings			
Disposal /Treatment Method:		30 percent of boards recycled, requiring manual deconstruction of the structures. The remaining 70 percent of material was disposed of, and these buildings were assumed not to be manually deconstructed.			
Environmental Media:		incineration			
Release or Emission Factor:		5E-06 release factor from incineration to WW or air			
Release Estimation Method:		estimated			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2008. Risk assessment: hexabromocyclododecane.				
Data Type	Release; Recycling; Insulation products in buildings; Completed Exposure or Risk Assessments;				
Hero ID	3970747				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Use is in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Unacceptable	4	Distribution characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.3		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Release Source:		demolotion of buildings - breaking boards for recycling			
Release or Emission Factor:		90 g EPS-particles/tonne EPS			
Release Estimation Method:		Measured			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2008. Risk assessment: hexabromocyclododecane.				
Data Type	Release; Disposal; Insulation products in buildings; Completed Exposure or Risk Assessments;				
Hero ID	3970747				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability	Metric 1: Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative	Metric 2: Geographic Scope	Acceptable	3	Europe	
	Metric 3: Applicability	Acceptable	3	Use is in scope	
	Metric 4: Temporal Representativeness	Acceptable	3	2008	
	Metric 5: Sample Size	Unacceptable	4	Distribution characterized by no statistics.	
Domain 3: Accessibility/Clarity	Metric 6: Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.3		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Release Source:		demolotion of buildings - breaking boards for disposal			
Release or Emission Factor:		release factor of 0.1 percent			
Release Estimation Method:		estimated			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2017. Chemical safety report: Hexabromocyclododecane and all major diastereoisomers identified.				
Data Type	Release; Processing; EPS / XPS Converting; Completed Exposure or Risk Assessments;				
Hero ID	3970748				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from 2004 Plastics Converting ESD	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	OECD	
Metric 3:	Applicability	Acceptable	3	In scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2004	
Metric 5:	Sample Size	Unacceptable	4	Unknown	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Limited discussion on uncertainty and variability	
Overall Quality Determination*		High	1.7		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Environmental Media:		Water, Land, Air, Incineration			
Release or Emission Factor:		Loss fractions cited from the 2004 Plastics Converting ESD			
Release Estimation Method:		Estimated			
Release Days per Year:		2004 Plastics Converting ESD			
Number of Sites:		2004 Plastics Converting ESD			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2017. Chemical safety report: Hexabromocyclododecane and all major diastereoisomers identified.				
Data Type	Release; Processing; Cutting of EPS boards; Completed Exposure or Risk Assessments;				
Hero ID	3970748				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Use is in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2003	
Metric 5:	Sample Size	Unacceptable	4	Unknown	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.6		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Environmental Media:		50 percent to surface water and 50 percent to air or landfill			
Release or Emission Factor:		100 g/tonnes HBCDD from cutting of boards			
Release Estimation Method:		Estimated			
Annual Release Quantity (kg/yr):		95 percent of the particles generated during cutting operations are assumed to end up in waste.			
Release Days per Year:		?230 days/yr			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2008. Risk assessment: hexabromocyclododecane.				
Data Type	Release; Processing; Sawing of EPS boards; Completed Exposure or Risk Assessments;				
Hero ID	3970747				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Use is in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2003	
Metric 5:	Sample Size	Unacceptable	4	Unknown	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.6		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Environmental Media:		50 percent to surface water and 50 percent to air or landfill			
Release or Emission Factor:		445 g particles per tonne EPS being released during sawing of EPS boards			
Release Estimation Method:		Measured			
Annual Release Quantity (kg/yr):		95 percent of the particles generated during cutting operations are assumed to end up in waste.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2017. Chemical safety report: Hexabromocyclododecane and all major diastereoisomers identified.				
Data Type	Release; Use; cutting of EPS boards at construction sites; Completed Exposure or Risk Assessments;				
Hero ID	3970748				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Use is in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2003	
Metric 5:	Sample Size	Unacceptable	4	Unknown	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.6		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Environmental Media:		50 percent to surface water and 50 percent to air			
Release or Emission Factor:		10 g particulates/tonnes EPS			
Release Estimation Method:		Estimated - During professional use (i.e.at construction sites) it is estimated that only 10 percent of boards are cut			
Release Days per Year:		250			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2017. Chemical safety report: Hexabromocyclododecane and all major diastereoisomers identified.				
Data Type	Release; Use; cutting of XPS boards at construction sites; Completed Exposure or Risk Assessments;				
Hero ID	3970748				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Use is in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2003	
Metric 5:	Sample Size	Unacceptable	4	Unknown	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.6		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Environmental Media:		50 percent to surface water and 50 percent to air			
Release or Emission Factor:		5 g XPS particlesper tonne XPS			
Release Estimation Method:		Estimated			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2017. Chemical safety report: Hexabromocyclododecane and all major diastereoisomers identified.				
Data Type	Release; Commercial Use; Insulation products in buildings; Completed Exposure or Risk Assessments;				
Hero ID	3970748				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Occupational scenario (use of insulation in offices).	
Metric 4:	Temporal Representativeness	Acceptable	3	2003	
Metric 5:	Sample Size	Unacceptable	4	Unknown	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination *		High	1.6		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Release Source:		service life of EPS boards at construction sites			
Environmental Media:		water, land, incineration			
Release or Emission Factor:		No loss of HBCD is expected to occur in the foam during service life, even when exposed to natural light.			
Release Estimation Method:		The service life of the boards is estimated as 30 to 100 years.			
Release Days per Year:		365			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2017. Chemical safety report: Hexabromocyclododecane and all major diastereoisomers identified.				
Data Type	Release; Commercial Use; Insulation products in buildings; Completed Exposure or Risk Assessments;				
Hero ID	3970748				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Occupational scenario (use of insulation in offices).	
Metric 4:	Temporal Representativeness	Acceptable	3	2003	
Metric 5:	Sample Size	Unacceptable	4	Unknown	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination *		High	1.6		
Extracted		Yes			
Parameter		EXTRACTION Data			
Release Source:		service life of EPS boards at construction sites			
Environmental Media:		air			
Release or Emission Factor:		release factor = 8.4E-06			
Release Estimation Method:		over a 100 year service life			
Daily Release Quantity (kg/day):		1.8E-05 kg/day			
Annual Release Quantity (kg/yr):		6.7E-03 kg/yr			
Release Days per Year:		365			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2017. Chemical safety report: Hexabromocyclododecane and all major diastereoisomers identified.				
Data Type	Release; Disposal; Insulation products in buildings; Completed Exposure or Risk Assessments;				
Hero ID	3970748				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability	Metric 1: Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative	Metric 2: Geographic Scope	Acceptable	3	Europe	
	Metric 3: Applicability	Acceptable	3	Use is in scope	
	Metric 4: Temporal Representativeness	Acceptable	3	2008	
	Metric 5: Sample Size	Unacceptable	4	Distribution characterized by no statistics.	
Domain 3: Accessibility/Clarity	Metric 6: Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.3		
Extracted		Yes			
Parameter		EXTRACTION Data			
Release Source:		demolition - breaking boards			
Environmental Media:		50 percent is assumed to go to waste water and 50 percent to air.			
Release or Emission Factor:		90 g EPS-particles/tonne EPS			
Release Estimation Method:		taken from EU RAR			
Release Days per Year:		365			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2017. Chemical safety report: Hexabromocyclododecane and all major diastereoisomers identified.				
Data Type	Release; Disposal; Insulation products in buildings; Completed Exposure or Risk Assessments;				
Hero ID	3970748				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability	Metric 1: Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative	Metric 2: Geographic Scope	Acceptable	3	Europe	
	Metric 3: Applicability	Acceptable	3	Use is in scope	
	Metric 4: Temporal Representativeness	Acceptable	3	2008	
	Metric 5: Sample Size	Unacceptable	4	Distribution characterized by no statistics.	
Domain 3: Accessibility/Clarity	Metric 6: Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.3		
Extracted		Yes			
Parameter		EXTRACTION Data			
Release Source:		demolition - disposal of boards			
Disposal /Treatment Method:		30 percent of boards recycled, requiring manual deconstruction of the structures. The remaining 70 percent of material was disposed of, and these buildings were assumed not to be manually deconstructed.			
Environmental Media:		incineration			
Release or Emission Factor:		5E-06 release factor from incineration to WW or air			
Release Estimation Method:		taken from EU RAR			
Release Days per Year:		330			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2017. Chemical safety report: Hexabromocyclododecane and all major diastereoisomers identified, Part 2.				
Data Type	Release; Processing; formulation of EPS beads; Completed Exposure or Risk Assessments;				
Hero ID	3970753				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Acceptable	3	Information is from trusted sources
Domain 2: Representative	Metric 2:	Geographic Scope	Acceptable	3	Europe
	Metric 3:	Applicability	Acceptable	3	EPS compounding not in scope but may provide insight into XPS compounding
	Metric 4:	Temporal Representativeness	Acceptable	3	2012
	Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.
Domain 3: Accessibility/Clarity	Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.
Overall Quality Determination *		High	1.6		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Release Source:		Waste-water from the reaction process			
Environmental Media:		wastewater			
Release or Emission Factor:		2 g per tonne of HBCDD used			
Release Estimation Method:		information from industry			
Release Days per Year:		?330 days			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2017. Chemical safety report: Hexabromocyclododecane and all major diastereoisomers identified, Part 2.				
Data Type	Release; Processing; formulation of EPS beads; Completed Exposure or Risk Assessments;				
Hero ID	3970753				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	EPS compounding not in scope but may provide insight into XPS compounding	
Metric 4:	Temporal Representativeness	Acceptable	3	2012	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination *		High	1.6		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Release Source:		waste packaging contaminated with the substance, filters, filter dust and off-spec product			
Disposal /Treatment Method:		release of less than 0.001 percent of the flame retardant put into the incinerator			
Environmental Media:		incineration			
Release or Emission Factor:		<0.5 percent of the HBCDD used to incineration			
Release Estimation Method:		information from industry			
Release Days per Year:		?330 days			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2017. Chemical safety report: Hexabromocyclododecane and all major diastereoisomers identified, Part 2.				
Data Type	Release; Processing; formulation of EPS beads; Completed Exposure or Risk Assessments;				
Hero ID	3970753				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	EPS compounding not in scope but may provide insight into XPS compounding	
Metric 4:	Temporal Representativeness	Acceptable	3	2012	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination *		High	1.6		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Environmental Media:		landfill			
Release or Emission Factor:		1 g per tonne of HBCDD used			
Release Estimation Method:		information from industry			
Release Days per Year:		?330 days			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2009. Background document for hexabromocyclododecane and all major diastereoisomers identified.				
Data Type	Release; manufacturing; manufacturing; Completed Exposure or Risk Assessments;				
Hero ID	3970750				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Manufacturing not in scope but maybe can be applied to im- portation	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, as- sessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination *		High	1.6		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Release Estimation Method:		Estimated - see table 3			
Annual Release Quantity (kg/yr):		2 kg/yr (air); <1 kg/y (WW)			
Number of Sites:		1			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2009. Background document for hexabromocyclododecane and all major diastereoisomers identified.				
Data Type	Release; Processing; Cutting of EPS boards; Completed Exposure or Risk Assessments;				
Hero ID	3970750				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Use is in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination *		High	1.4		
Extracted		Yes			
Parameter		EXTRACTION Data			
Release Source:		Cutting of EPS boards			
Environmental Media:		air			
Release or Emission Factor:		100 g/tonnes HBCDD from cutting of boards			
Release Estimation Method:		taken from EU RAR			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2009. Background document for hexabromocyclododecane and all major diastereoisomers identified.				
Data Type	Release; Use; cutting of XPS boards at construction sites; Completed Exposure or Risk Assessments;				
Hero ID	3970750				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability	Metric 1: Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative	Metric 2: Geographic Scope	Acceptable	3	Europe	
	Metric 3: Applicability	Acceptable	3	Use is in scope	
	Metric 4: Temporal Representativeness	Acceptable	3	2008	
	Metric 5: Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity	Metric 6: Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination*		High	1.4		
Extracted		Yes			
Parameter		EXTRACTION Data			
Environmental Media:		air			
Release or Emission Factor:		5 g XPS particlesper tonne XPS			
Release Estimation Method:		taken from EU RAR			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2009. Background document for hexabromocyclododecane and all major diastereoisomers identified.				
Data Type	Release; Commercial Use; Insulation products in buildings; Completed Exposure or Risk Assessments;				
Hero ID	3970750				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability	Metric 1: Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative	Metric 2: Geographic Scope	Acceptable	3	Europe	
	Metric 3: Applicability	Acceptable	3	Occupational scenario (use of insulation in offices).	
	Metric 4: Temporal Representativeness	Acceptable	3	2008	
	Metric 5: Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity	Metric 6: Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination *		High	1.4		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Release Source:		service life of EPS and XPS boards at construction sites			
Environmental Media:		air			
Release Estimation Method:		measured			
Annual Release Quantity (kg/yr):		70 kg/year			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2009. Background document for hexabromocyclododecane and all major diastereoisomers identified.				
Data Type	Release; Processing; XPS Compounding / Masterbatch; Completed Exposure or Risk Assessments;				
Hero ID	3970750				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Use is in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination*		High	1.4		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Environmental Media:		air, wastewater, surface water			
Release Estimation Method:		Estimated - see table 3			
Annual Release Quantity (kg/yr):		14 kg/y (air), 84 kg/y (WW), 10 kg/y (surface water)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2009. Background document for hexabromocyclododecane and all major diastereoisomers identified.				
Data Type	Release; Processing; EPS and HIPS formulation; Completed Exposure or Risk Assessments;				
Hero ID	3970750				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability	Metric 1: Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative	Metric 2: Geographic Scope	Acceptable	3	Europe	
	Metric 3: Applicability	Acceptable	3	EPS and HIPS compounding not in scope but may provide insight into XPS compounding	
	Metric 4: Temporal Representativeness	Acceptable	3	2008	
	Metric 5: Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity	Metric 6: Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination*		High	1.7		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Environmental Media:		air, wastewater, surface water			
Release Estimation Method:		Estimated - see table 3			
Annual Release Quantity (kg/yr):		30 kg/y (air), 75 kg/y (WW), 330 kg/y (surface water)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2009. Background document for hexabromocyclododecane and all major diastereoisomers identified.				
Data Type	Release; Processing; EPS converting from beads to foam; Completed Exposure or Risk Assessments;				
Hero ID	3970750				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Use is in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination *		High	1.4		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Environmental Media:		air, wastewater, surface water			
Release Estimation Method:		Estimated - see table 3			
Annual Release Quantity (kg/yr):		159 kg/y (air), 128 kg/y (WW), 31 kg/y (surface water)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2009. Background document for hexabromocyclododecane and all major diastereoisomers identified.				
Data Type	Release; Processing; XPS converting from beads to foam; Completed Exposure or Risk Assessments;				
Hero ID	3970750				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Use is in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination *		High	1.4		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Environmental Media:		air, wastewater, surface water			
Release Estimation Method:		Estimated - see table 3			
Annual Release Quantity (kg/yr):		146 kg/y (air), 63 kg/y (WW), 16 kg/y (surface water)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2015. RAC and SEAC Opinion on an application for authorisation for hexabromocyclododecane.			
Data Type	Release; Disposal; Insulation products in buildings; Reports for Data or Information Other than Exposure or Release Data;			
Hero ID	3970755			
Domain	Metric	Rating	Score	Comments
Domain 1: Reliability				
Metric 1:	Methodology	Acceptable	3	Not from trusted sources; however, Associated information does not indicate flaws or quality issues
Domain 2: Representative				
Metric 2:	Geographic Scope	Acceptable	3	Europe
Metric 3:	Applicability	Acceptable	3	Use is in scope
Metric 4:	Temporal Representativeness	Acceptable	3	2014
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.
Domain 3: Accessibility/Clarity				
Metric 6:	Metadata Completeness	Unacceptable	4	report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.
Domain 4: Variability and Uncertainty				
Metric 7:	Metadata Completeness	Acceptable	3	Fully addresses variability and uncertainty
Overall Quality Determination *		High	1.7	
Extracted		Yes		
EXTRACTION				
Parameter		Data		
Release Source:		demolition - disposal of EPS boards		
Environmental Media:		incineration		
Release or Emission Factor:		90 g HBCD/tonne EPS boards		
Release Estimation Method:		proposed by industry		
Annual Release Quantity (kg/yr):		3.20 tonnes/yr (if 32,000 tonnes HBCDD are used)		

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2015. RAC and SEAC Opinion on an application for authorisation for hexabromocyclododecane.			
Data Type	Release; Use; construction / installation of EPS boards at consrtuction sites; Reports for Data or Information Other than Exposure or Release Data;			
Hero ID	3970755			
Domain	Metric	Rating	Score	Comments
Domain 1: Reliability				
Metric 1:	Methodology	Acceptable	3	Not from trusted sources; however, Associated information does not indicate flaws or quality issues
Domain 2: Representative				
Metric 2:	Geographic Scope	Acceptable	3	Europe
Metric 3:	Applicability	Acceptable	3	Use is in scope
Metric 4:	Temporal Representativeness	Acceptable	3	2014
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.
Domain 3: Accessibility/Clarity				
Metric 6:	Metadata Completeness	Unacceptable	4	report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.
Domain 4: Variability and Uncertainty				
Metric 7:	Metadata Completeness	Acceptable	3	Fully addresses variability and uncertainty
Overall Quality Determination *		High	1.7	
Extracted		Yes		
EXTRACTION				
Parameter		Data		
Environmental Media:		unknown		
Release or Emission Factor:		10 g HBCD/tonne EPS boards		
Release Estimation Method:		proposed by industry		
Annual Release Quantity (kg/yr):		1.97 tonnes/yr (if 32,000 tonnes HBCDD are used)		

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	European Flame Retardants, Association. 2016. Fireaway! the EFRA newsletter.			
Data Type	Release; Disposal; HIPS; Reports for Data or Information Other than Exposure or Release Data;			
Hero ID	3981170			
Domain	Metric	Rating	Score	Comments
Domain 1: Reliability				
Metric 1:	Methodology	Unacceptable	4	The data, data sources, and/or techniques used in the assessment or report are not specified.
Domain 2: Representative				
Metric 2:	Geographic Scope	Acceptable	3	Belgium
Metric 3:	Applicability	Unacceptable	4	disposal of this material is not in scope and this information does not seem applicable to in-scope scenarios
Metric 4:	Temporal Representativeness	Acceptable	3	2016
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.
Domain 3: Accessibility/Clarity				
Metric 6:	Metadata Completeness	Unacceptable	4	report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.
Domain 4: Variability and Uncertainty				
Metric 7:	Metadata Completeness	Unacceptable	4	does not address variability or uncertainty
Overall Quality Determination *		Unacceptable	4.0	
Extracted		Yes		
EXTRACTION				
Parameter		Data		
Release Source:		household waste		
Environmental Media:		71 percent reused, recycled or composted; 27 percent is incinerated; <1 percent is landfilled		

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Duan, H.,Yu, D.,Zuo, J.,Yang, B.,Zhang, Y.,Niu, Y.. 2016. Characterization of brominated flame retardants in construction and demolition waste components: HBCD and PBDEs. Science of the Total Environment.				
Data Type	Release; Disposal; Insulation products in buildings; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3575294				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Journal article	
Domain 2: Representative					
Metric 2:	Geographic Scope	Unacceptable	4	China	
Metric 3:	Applicability	Acceptable	3	disposal in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2016	
Metric 5:	Sample Size	Acceptable	3	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Fully addresses variability and uncertainty	
Overall Quality Determination*		High	1.2		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Release Source:		sorting and crushing			
Environmental Media:		air			
Release or Emission Factor:		Original HBCD constituent in C&D waste is released into the atmosphere during these sorting and crushing operations, and is assumed to contribute 10 percent of the atmospheric emissions in the demolition process.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Duan, H.,Yu, D.,Zuo, J.,Yang, B.,Zhang, Y.,Niu, Y.. 2016. Characterization of brominated flame retardants in construction and demolition waste components: HBCD and PBDEs. Science of the Total Environment.				
Data Type	Release; Disposal; Insulation products in buildings; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3575294				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability	Metric 1: Methodology	Acceptable	3	Journal article	
Domain 2: Representative	Metric 2: Geographic Scope	Unacceptable	4	China	
	Metric 3: Applicability	Acceptable	3	disposal in scope	
	Metric 4: Temporal Representativeness	Acceptable	3	2016	
	Metric 5: Sample Size	Acceptable	3	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative	
Domain 3: Accessibility/Clarity	Metric 6: Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Acceptable	3	Fully addresses variability and uncertainty	
Overall Quality Determination*		High	1.2		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Release Source:		landfilling of foam insulation			
Environmental Media:		landfill			
Release or Emission Factor:		7039.00 ?g/kg of HBCD found in foam in landfills			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	U.S, E. P. A.. 2015. TSCA Work Plan chemical problem formulation and initial assessment. Cyclic aliphatic bromide cluster flame retardants.				
Data Type	Release; Processing; EPS compounding; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3809277				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Previous risk assessments	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	EPS and HIPS compounding not in scope but may provide insight into XPS compounding	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination *		High	1.6		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Release Source:		This is the emission factor for a generic site and was determined based on the 90th percentile of measurements of concentration in the effluent from the on-site sewer treatment plants of 9 of the total of 13 sites.			
Environmental Media:		water			
Release or Emission Factor:		7.60E-06			
Release Estimation Method:		taken from 2008 EU assessment (HERO 3970747)			
Release Days per Year:		300			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	U.S, E. P. A.. 2015. TSCA Work Plan chemical problem formulation and initial assessment. Cyclic aliphatic bromide cluster flame retardants.				
Data Type	Release; Processing; EPS compounding; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3809277				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Previous risk assessments	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	EPS and HIPS compounding not in scope but may provide insight into XPS compounding	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.6		
Extracted		Yes			
Parameter		EXTRACTION Data			
Release Source:		This is the emission factor for a generic site and is equal to the maximum emission factor calculated from site-specific data that pertain to three processing steps including formulation of EPS and XPS compounds.			
Environmental Media:		air			
Release or Emission Factor:		7.60E-06			
Release Estimation Method:		taken from 2008 EU assessment (HERO 3970747)			
Release Days per Year:		300			
Number of Sites:		13			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	U.S, E. P. A.. 2015. TSCA Work Plan chemical problem formulation and initial assessment. Cyclic aliphatic bromide cluster flame retardants.				
Data Type	Release; Processing; EPS compounding; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3809277				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Previous risk assessments	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Australia	
Metric 3:	Applicability	Acceptable	3	EPS and HIPS compounding not in scope but may provide insight into XPS compounding	
Metric 4:	Temporal Representativeness	Acceptable	3	2012	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.6		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Release Source:		These values are reasonable worst case values that are the sums of emission factors for handling and compounding solid flame retardants with particle sizes <40 ?m that are also of relatively high volatility as reported in OECD (2004b).			
Environmental Media:		water			
Release or Emission Factor:		6.80E-03			
Release Estimation Method:		taken from 2012 Australian assessment (HERO 3978355)			
Release Days per Year:		150			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7; Medium = ≥ 1.7 to < 2.4; Low = ≥ 2.4 to < 3.

Study Citation:	U.S, E. P. A.. 2015. TSCA Work Plan chemical problem formulation and initial assessment. Cyclic aliphatic bromide cluster flame retardants.				
Data Type	Release; Processing; EPS compounding; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3809277				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Previous risk assessments	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Australia	
Metric 3:	Applicability	Acceptable	3	EPS and HIPS compounding not in scope but may provide insight into XPS compounding	
Metric 4:	Temporal Representativeness	Acceptable	3	2012	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.6		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Release Source:		These values are reasonable worst case values that are the sums of emission factors for handling and compounding solid flame retardants with particle sizes <40 ?m that are also of relatively high volatility as reported in OECD (2004b).			
Environmental Media:		air			
Release or Emission Factor:		2.50E-04			
Release Estimation Method:		taken from 2012 Australian assessment (HERO 3978355)			
Release Days per Year:		150			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7; Medium = ≥ 1.7 to < 2.4; Low = ≥ 2.4 to < 3.

Study Citation:	U.S, E. P. A.. 2015. TSCA Work Plan chemical problem formulation and initial assessment. Cyclic aliphatic bromide cluster flame retardants.				
Data Type	Release; Processing; EPS Converting; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3809277				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Previous risk assessments	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.3		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Release Source:		These are the emission factors for the generic site and are reported in OECD (2004b) as the emission factors for organic flame-retardants of relatively low volatility in partially open plastics conversion processes.			
Environmental Media:		water			
Release or Emission Factor:		3.00E-05			
Release Estimation Method:		taken from 2008 EU assessment (HERO 3970747)			
Release Days per Year:		300			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	U.S, E. P. A.. 2015. TSCA Work Plan chemical problem formulation and initial assessment. Cyclic aliphatic bromide cluster flame retardants.				
Data Type	Release; Processing; EPS Converting; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3809277				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Previous risk assessments	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination *		High	1.3		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Release Source:		These are the emission factors for the generic site and are reported in OECD (2004b) as the emission factors for organic flame-retardants of relatively low volatility in partially open plastics conversion processes.			
Environmental Media:		air			
Release or Emission Factor:		3.00E-05			
Release Estimation Method:		taken from 2008 EU assessment (HERO 3970747)			
Release Days per Year:		300			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	U.S, E. P. A.. 2015. TSCA Work Plan chemical problem formulation and initial assessment. Cyclic aliphatic bromide cluster flame retardants.				
Data Type	Release; Processing; EPS Converting; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3809277				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Previous risk assessments	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Australia	
Metric 3:	Applicability	Acceptable	3	in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2012	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.3		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Release Source:		These emission factors are weighted averages of emission factors for organic flame of relatively high volatility in closed plastics conversion processes that are reported in OECD (2004b). The emission factors that were averaged include values for high process temperature and low plastics production volume.			
Environmental Media:		water			
Release or Emission Factor:		1.60E-03			
Release Estimation Method:		taken from 2012 Australian assessment (HERO 3978355)			
Release Days per Year:		200			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	U.S. E. P. A.. 2015. TSCA Work Plan chemical problem formulation and initial assessment. Cyclic aliphatic bromide cluster flame retardants.				
Data Type	Release; Processing; EPS Converting; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3809277				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Previous risk assessments	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Australia	
Metric 3:	Applicability	Acceptable	3	in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2012	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.3		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Release Source:		These emission factors are weighted averages of emission factors for organic flame of relatively high volatility in closed plastics conversion processes that are reported in OECD (2004b). The emission factors that were averaged include values for high process temperature and low plastics production volume.			
Environmental Media:		air			
Release or Emission Factor:		1.60E-03			
Release Estimation Method:		taken from 2012 Australian assessment (HERO 3978355)			
Release Days per Year:		200			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	U.S, E. P. A.. 2015. TSCA Work Plan chemical problem formulation and initial assessment. Cyclic aliphatic bromide cluster flame retardants.				
Data Type	Release; Processing; Compounding of Polystyrene Resin to Produce XPS Masterbatch; Reports for Data or Information Other than Exposure or Release Data				
Hero ID	3809277				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Previous risk assessments	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.3		
Extracted		Yes			
EXTRACTION					
Parameter	Data				
Release Source:	This is the emission factor for a generic site and is equal to the maximum of emission factors calculated from sitespecific data for three sites.				
Environmental Media:	water				
Release or Emission Factor:	7.40E-06				
Release Estimation Method:	taken from 2008 EU assessment (HERO 3970747)				
Release Days per Year:	300				

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	U.S, E. P. A.. 2015. TSCA Work Plan chemical problem formulation and initial assessment. Cyclic aliphatic bromide cluster flame retardants.				
Data Type	Release; Processing; Compounding of Polystyrene Resin to Produce XPS Masterbatch; Reports for Data or Information Other than Exposure or Release Data				
Hero ID	3809277				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Previous risk assessments	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.3		
Extracted		Yes			

EXTRACTION	
Parameter	Data
Release Source:	This is the emission factor for a generic site and is equal to the maximum emission factor calculated from site-specific data that pertain to three processing steps including formulation of EPS and XPS compounds.
Environmental Media:	air
Release or Emission Factor:	7.30E-06
Release Estimation Method:	taken from 2008 EU assessment (HERO 3970747)
Release Days per Year:	300

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	U.S, E. P. A.. 2015. TSCA Work Plan chemical problem formulation and initial assessment. Cyclic aliphatic bromide cluster flame retardants.				
Data Type	Release; Processing; Compounding of Polystyrene Resin to Produce XPS Masterbatch; Reports for Data or Information Other than Exposure or Release Data				
Hero ID	3809277				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Previous risk assessments	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Canada	
Metric 3:	Applicability	Acceptable	3	in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2011	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.3		
Extracted		Yes			

EXTRACTION	
Parameter	Data
Release Source:	This is the emission factor for a generic site and is the sum of emission factors for handling and compounding organic solid flame retardants with particle sizes <40 µm that are of relatively medium volatility as reported in OECD (2004b).
Environmental Media:	water
Release or Emission Factor:	6.60E-03
Release Estimation Method:	taken from 2011 Canadian assessment
Release Days per Year:	60 or 200

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7; Medium= ≥ 1.7 to < 2.4; Low= ≥ 2.4 to < 3.

Study Citation:	U.S, E. P. A.. 2015. TSCA Work Plan chemical problem formulation and initial assessment. Cyclic aliphatic bromide cluster flame retardants.				
Data Type	Release; Processing; XPS converting; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3809277				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Previous risk assessments	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.3		
Extracted		Yes			
Parameter		EXTRACTION Data			
Release Source:		These are the emission factors for the generic site and are equal to the maxima of the emission factors that were derived from site-specific data but were not explicitly reported. EPA calculated these factors, each of which is equal to the ratio of total annual releases from 13 sites for which site-specific data was not reported and the total annual processing rate for these sites.			
Environmental Media:		water			
Release or Emission Factor:		2.60E-05			
Release Days per Year:		1			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	U.S. E. P. A.. 2015. TSCA Work Plan chemical problem formulation and initial assessment. Cyclic aliphatic bromide cluster flame retardants.				
Data Type	Release; Processing; XPS converting; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3809277				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Previous risk assessments	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination *		High	1.3		
Extracted		Yes			
EXTRACTION					
Data					
Release Source:		These are the emission factors for the generic site and are equal to the maxima of the emission factors that were derived from site-specific data but were not explicitly reported. EPA calculated these factors, each of which is equal to the ratio of total annual releases from 13 sites for which site-specific data was not reported and the total annual processing rate for these sites.			
Environmental Media:		air			
Release or Emission Factor:		5.80E-05			
Release Days per Year:		300			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	. 2008. Summary risk assessment report: Hexabromocyclododecane.				
Data Type	Release; All; Completed Exposure or Risk Assessments;				
Hero ID	3970756				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Captures releases from all possible stages, some of which are not in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination*		High	1.7		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Release Source:		Total EU 15 emissions of HBCDD. Most emissions (81 percent) are estimated to come from the industrial of use of HBCDD in textile back-coating.			
Environmental Media:		72 percent WW, 22 percent SW, 6 percent air			
Release or Emission Factor:		0.1 percent of PV			
Release Estimation Method:		taken from 2008 EU assessment (HERO 3970747)			
Annual Release Quantity (kg/yr):		8.7 tonnes/yr			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2011. Proposal for identification of a substance as a CMR Cat 1 or 2, PBT, vPvB, or a substance of an equivalent level of concern: Proposal for identification of hexabromocyclododecane as a SVHC.				
Data Type	Release; All; Completed Exposure or Risk Assessments;				
Hero ID	3970757				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Captures releases from all possible stages, some of which are not in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination*		High	1.7		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Release Source:		Total EU 15 emissions of HBCDD. Most emissions (81 percent) are estimated to come from the industrial of use of HBCDD in textile back-coating.			
Environmental Media:		72 percent WW, 22 percent SW, 6 percent air			
Release or Emission Factor:		0.1 percent of PV			
Release Estimation Method:		taken from 2008 EU assessment (HERO 3970747)			
Annual Release Quantity (kg/yr):		8.7 tonnes/yr			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2009. Prioritisation and Annex XIV background information: hexbromocyclododecane.				
Data Type	Release; manufacturing; manufacturing; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3970759				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Previous risk assessments	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Manufacturing not in scope but maybe can be applied to im- portation	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, as- sessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination*		High	1.7		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Environmental Media:		air and wastewater			
Release Estimation Method:		same as HERO ID 3970750			
Annual Release Quantity (kg/yr):		2 kg/yr (air); 0.73 kg/y (WW)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	Echa., 2009. Prioritisation and Annex XIV background information: hexbromocyclododecane.				
Data Type	Release; Commercial Use; Insulation products in buildings; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3970759				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Previous risk assessments	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Occupational scenario (use of insulation in offices).	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination*		High	1.4		
Extracted		Yes			
EXTRACTION					
Parameter	Data				
Release Source:	service life of EPS and XPS boards at construction sites				
Environmental Media:	air				
Release Estimation Method:	same as HERO ID 3970751				
Annual Release Quantity (kg/yr):	70 kg/year				

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa., 2009. Prioritisation and Annex XIV background information: hexbromocyclododecane.				
Data Type	Release; Processing; XPS Compounding / Masterbatch; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3970759				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Previous risk assessments	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Use is in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination*		High	1.4		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Environmental Media:		air, wastewater, surface water			
Release Estimation Method:		same as HERO ID 3970752			
Annual Release Quantity (kg/yr):		14 kg/y (air), 84 kg/y (WW), 10 kg/y (surface water)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2009. Prioritisation and Annex XIV background information: hexbromocyclododecane.				
Data Type	Release; Processing; EPS and HIPS formulation; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3970759				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Previous risk assessments	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	EPS and HIPS compounding not in scope but may provide insight into XPS compounding	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination*		High	1.7		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Environmental Media:		air, wastewater, surface water			
Release Estimation Method:		same as HERO ID 3970753			
Annual Release Quantity (kg/yr):		30 kg/y (air), 75 kg/y (WW), 330 kg/y (surface water)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2009. Prioritisation and Annex XIV background information: hexbromocyclododecane.				
Data Type	Release; Processing; EPS converting from beads to foam; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3970759				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Acceptable	3	Previous risk assessments
Domain 2: Representative	Metric 2:	Geographic Scope	Acceptable	3	Europe
	Metric 3:	Applicability	Acceptable	3	Use is in scope
	Metric 4:	Temporal Representativeness	Acceptable	3	2008
	Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.
Domain 3: Accessibility/Clarity	Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Acceptable	3	limited discussion
Overall Quality Determination *		High	1.4		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Environmental Media:		air, wastewater, surface water			
Release Estimation Method:		same as HERO ID 3970754			
Annual Release Quantity (kg/yr):		159 kg/y (air), 128 kg/y (WW), 31 kg/y (surface water)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2009. Prioritisation and Annex XIV background information: hexbromocyclododecane.				
Data Type	Release; Processing; XPS converting from beads to foam; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3970759				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Previous risk assessments	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Use is in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, as- sessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination*		High	1.4		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Environmental Media:		air, wastewater, surface water			
Release Estimation Method:		same as HERO ID 3970755			
Annual Release Quantity (kg/yr):		146 kg/y (air), 63 kg/y (WW), 16 kg/y (surface water)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	European Flame Retardants, Association. 2013. Fireaway! the EFRA newsletter, Part 2.			
Data Type	Release; Disposal; Disposal of packaging; Reports for Data or Information Other than Exposure or Release Data;			
Hero ID	3981171			
Domain	Metric	Rating	Score	Comments
Domain 1: Reliability				
Metric 1:	Methodology	Unacceptable	4	The data, data sources, and/or techniques used in the assessment or report are not specified.
Domain 2: Representative				
Metric 2:	Geographic Scope	Acceptable	3	Belgium
Metric 3:	Applicability	Unacceptable	4	disposal of this material is not in scope and this information does not seem applicable to in-scope scenarios
Metric 4:	Temporal Representativeness	Acceptable	3	2010-2014
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.
Domain 3: Accessibility/Clarity				
Metric 6:	Metadata Completeness	Unacceptable	4	provides results, but the underlying methods, data sources, and assumptions are not fully transparent.
Domain 4: Variability and Uncertainty				
Metric 7:	Metadata Completeness	Unacceptable	4	does not address variability or uncertainty
Overall Quality Determination *		Unacceptable	4.0	
Extracted		Yes		
EXTRACTION				
Parameter		Data		
Environmental Media:		97 percent was incinerated while 3 percent went to controlled landfill		

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	European Flame Retardants, Association. 2013. Fireaway! the EFRA newsletter, Part 2.			
Data Type	Release; Disposal / Recycle; Waste of Electric and Electronic Equipment (WEEE); Reports for Data or Information Other than Exposure or Release Data;			
Hero ID	3981171			
Domain	Metric	Rating	Score	Comments
Domain 1: Reliability				
Metric 1:	Methodology	Unacceptable	4	The data, data sources, and/or techniques used in the assessment or report are not specified.
Domain 2: Representative				
Metric 2:	Geographic Scope	Acceptable	3	Belgium
Metric 3:	Applicability	Unacceptable	4	disposal of this material is not in scope and this information does not seem applicable to in-scope scenarios
Metric 4:	Temporal Representativeness	Acceptable	3	2010-2014
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.
Domain 3: Accessibility/Clarity				
Metric 6:	Metadata Completeness	Unacceptable	4	provides results, but the underlying methods, data sources, and assumptions are not fully transparent.
Domain 4: Variability and Uncertainty				
Metric 7:	Metadata Completeness	Unacceptable	4	does not address variability or uncertainty
Overall Quality Determination *		Unacceptable	4.0	
Extracted		Yes		
EXTRACTION				
Parameter		Data		
Disposal /Treatment Method:		12wt percent of collected WEEE plastics and almost no FR plastics are currently recycled were recycled in 2010		
Annual Release Quantity (kg/yr):		700,000 tons/yr of annual waste WEEE is expected to contain FRs		

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Gorga, M.,Martínez, E.,Ginebreda, A.,Eljarrat, E.,Barceló, D.. 2013. Determination of PBDEs, HBB, PBEB, DBDPE, HBCD, TBBPA and related compounds in sewage sludge from Catalonia (Spain). Science of the Total Environment.				
Data Type	Release; All; Wastewater treatment sludge; Environmental Release Data;				
Hero ID	1676764				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Spain	
Metric 3:	Applicability	Acceptable	3	Captures releases from all possible stages, some of which are not in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2013	
Metric 5:	Sample Size	Acceptable	3	Sample size provided with some statistical information such as recovery percent and relative standard deviation	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	The report does not address variability or uncertainty with respect to this data element.	
Overall Quality Determination*		High	1.7		
Extracted		Yes			
Parameter		EXTRACTION Data			
Release Source:		HBCD measured in anaerobic digestion and activated sludge			
Disposal /Treatment Method:		Sewage sludge to soil application, compost, dump, thermal drying, agrarian, or dehydration.			
Environmental Media:		water, land, incineration			
Release or Emission Factor:		5.17 - 97.5 ng/g dry weight (dw) (mean - 19.3 ng/g dw)			
Release Estimation Method:		Measured			
Annual Release Quantity (kg/yr):		0.757 kg/yr			
Number of Sites:		17			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Tomko, G.,McDonald, K. M.. 2013. Environmental fate of hexabromocyclododecane from a new Canadian electronic recycling facility. Journal of Environmental Management.				
Data Type	Release; Disposal; Disposal of Waste of Electric and Electronic Equipment (WEEE); Published Models for Exposures or Releases;				
Hero ID	1927574				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	scientifically sound; no errors found	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Canada	
Metric 3:	Applicability	Unacceptable	4	Out of scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2013	
Metric 5:	Sample Size	N/A	N/A	Parameter is not applicable to models	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Model approach, equations, and choice of parameter values are transparent and clear	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination *		Unacceptable	4.0		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Release Source:		Releases from canadian recycling facility			
Annual Release Quantity (kg/yr):		Annual releases in Table 2			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Bsef,. 2009. HBCD hexabromocyclododecane fact sheet.			
Data Type	Release; manufacturing; manufacturing; Reports for Data or Information Other than Exposure or Release Data;			
Hero ID	3981179			
Domain	Metric	Rating	Score	Comments
Domain 1: Reliability				
Metric 1:	Methodology	Acceptable	3	Sources arent necessarily trusted but do not seem flawed
Domain 2: Representative				
Metric 2:	Geographic Scope	Acceptable	3	US
Metric 3:	Applicability	Unacceptable	4	Out of scope and not applicable to in scope
Metric 4:	Temporal Representativeness	Acceptable	3	2009
Metric 5:	Sample Size	N/A	N/A	This metric is not applicable to this data type
Domain 3: Accessibility/Clarity				
Metric 6:	Metadata Completeness	Acceptable	3	Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty				
Metric 7:	Metadata Completeness	Unacceptable	4	The report does not address variability or uncertainty
Overall Quality Determination *		Unacceptable	4.0	
Extracted		Yes		
EXTRACTION				
Parameter		Data		
Number of Sites:		1		
Waste Treatment Method:		Wastewater from the production process is treated at the plant by an advanced wastewater treatment facility including filtration, active carbon treatment and bio membrane reactor, resulting in effluents that can be safely discharged.		

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	Zhang, H.,Kuo, Y. Y.,Gerecke, A. C.,Wang, J.. 2012. Co-release of hexabromocyclododecane (HBCD) and Nano- and microparticles from thermal cutting of polystyrene foams. Environmental Science and Technology.				
Data Type	Release; Processing; XPS Thermal Cutting; Completed Exposure or Risk Assessments;				
Hero ID	1927576				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Switzerland	
Metric 3:	Applicability	Acceptable	3	in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2012	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination *		High	1.6		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Release Source:		Thermal cutting operation modeled in a closed sampling system			
Disposal /Treatment Method:		Particulate (dust)			
Environmental Media:		Release rate per hour during the thermal cutting operation			
Release or Emission Factor:		4.0E12 particles per hour released or 160.4 ug HBCD per hour released			
Release Estimation Method:		Measured			
Daily Release Quantity (kg/day):		1.2832E-06			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Zhang, H.,Kuo, Y. Y.,Gerecke, A. C.,Wang, J.. 2012. Co-release of hexabromocyclododecane (HBCD) and Nano- and microparticles from thermal cutting of polystyrene foams. Environmental Science and Technology.				
Data Type	Release; Processing; EPS Thermal Cutting; Completed Exposure or Risk Assessments;				
Hero ID	1927576				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Switzerland	
Metric 3:	Applicability	Acceptable	3	in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2012	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination *		High	1.6		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Release Source:		Thermal cutting operation modeled in a closed sampling system			
Disposal /Treatment Method:		Particulate (dust)			
Environmental Media:		Release rate per hour during the thermal cutting operation			
Release or Emission Factor:		5.0E12 particles per hour released or 249.1 ug HBCD per hour released			
Release Estimation Method:		Measured			
Daily Release Quantity (kg/day):		1.9928E-06			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	European Flame Retardants, Association. 2015. Keeping fire in check an introduction to flame retardants used in transport applications.				
Data Type	Release; All; Unknown; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3986543				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability	Metric 1: Methodology	Acceptable	3	From industry survey	
Domain 2: Representative	Metric 2: Geographic Scope	Acceptable	3	Europe	
	Metric 3: Applicability	Acceptable	3	Captures releases from all possible stages, some of which are not in scope	
	Metric 4: Temporal Representativeness	Acceptable	3	Unknown, but cites sources as recent as 2013	
	Metric 5: Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity	Metric 6: Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination *		Medium	1.9		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Environmental Media:		water, air			
Release or Emission Factor:		1.5 grams/ton HBCD (water); 47.3 grams/ton HBCD (air) (2013)			
Release Estimation Method:		Estimated via industry survey			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Gao, S.,Wang, J.,Yu, Z.,Guo, Q.,Sheng, G.,Fu, J.. 2011. Hexabromocyclododecanes in surface soils from E-waste recycling areas and industrial areas in South China: concentrations, diastereoisomer- and enantiomer-specific profiles, and inventory. Environmental Science and Technology.				
Data Type	Release; Disposal; Disposal of Waste of Electric and Electronic Equipment (WEEE); Environmental Release Data;				
Hero ID	1927645				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Release rate is an estimate for entire lifecycle	
Domain 2: Representative					
Metric 2:	Geographic Scope	Unacceptable	4	China	
Metric 3:	Applicability	Unacceptable	4	Out of scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2011	
Metric 5:	Sample Size	Acceptable	3	Statistical distribution of samples is fully characterized.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Release data do not include any needed metadata to understand what the data represent and are not usable in the risk evaluation	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		Unacceptable	4.0		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Release Source:		The mean concentrations of total HBCDs in the surface soils ranged from 0.22 to 0.79 and from 0.31 to 9.99 ng/g dw for two surrounding e-waste recycling sites and industrial areas.			
Annual Release Quantity (kg/yr):		estimates of 3.42 kg and 1.84 tonnes for the e-waste recycling areas and industrial areas (these areas include electronics, textiles, and building materials)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	Morf, L. S.,Trempe, J.,Gloor, R.,Huber, Y.,Stengele, M.,Zennegg, M.. 2005. Brominated flame retardants in waste electrical and electronic equipment: substance flows in a recycling plant. Environmental Science and Technology.				
Data Type	Release; Disposal; Disposal of Waste of Electric and Electronic Equipment (WEEE); Environmental Release Data;				
Hero ID	1927802				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Should represent loss if WEEE is entirely disposed of	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Switzerland	
Metric 3:	Applicability	Unacceptable	4	Out of scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2005	
Metric 5:	Sample Size	Acceptable	3	Statistical distribution of samples is fully characterized.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	data include all associated metadata,	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination *		Unacceptable	4.0		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Release Source:		Concentration of HBCD in WEEE			
Release or Emission Factor:		17 mg HBCD/kg WEEE			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Stubblings, W. A.,Harrad, S.. 2014. Extent and mechanisms of brominated flame retardant emissions from waste soft furnishings and fabrics: A critical review. Environment International.				
Data Type	Release; Disposal; waste textiltiles; Environmental Release Data;				
Hero ID	2528334				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Only represents air release from waste textiles	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	UK	
Metric 3:	Applicability	Unacceptable	4	Out of scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2014	
Metric 5:	Sample Size	Acceptable	3	Statistical distribution of samples is fully characterized.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	data include all associated metadata,	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		Unacceptable	4.0		
Extracted		Yes			
Parameter		EXTRACTION Data			
Release Source:		emissions from waste textiles			
Environmental Media:		air			
Release or Emission Factor:		200-3000 mg HBCD/m2 textile-hour			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Remberger, M.,Sternbeck, J.,Palm, A.,Kaj, L.,Strömberg, K.,Brorström-Lundén, E.. 2004. The environmental occurrence of hexabromocyclododecane in Sweden. Chemosphere.				
Data Type	Release; Use; XPS Foam; Monitoring Data;				
Hero ID	1927826				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Data from trusted source	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Sweden	
Metric 3:	Applicability	Unacceptable	4	Information related to in-scope scenario but not to engineering assessment	
Metric 4:	Temporal Representativeness	Acceptable	3	2004	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination *		Unacceptable	4.0		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Release Source:		Samples were taken 300-700 meters from a Swedish textile factory that manufactures XPS treated with HBCD two weeks per year			
Environmental Media:		Water, Air, Land			
Release or Emission Factor:		Air - 1070 ng/m3Soil - 140 to 1,300 ug/kg dry weight			
Release Estimation Method:		Concentration in the soil and air			
Number of Sites:		1			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Remberger, M.,Sternbeck, J.,Palm, A.,Kaj, L.,Strömberg, K.,Brorström-Lundén, E.. 2004. The environmental occurrence of hexabromocyclododecane in Sweden. Chemosphere.				
Data Type	Release; Disposal; Landfill; Monitoring Data;				
Hero ID	1927826				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Data from trusted source	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Sweden	
Metric 3:	Applicability	Unacceptable	4	Information related to in-scope scenario but not to engineering assessment	
Metric 4:	Temporal Representativeness	Acceptable	3	2004	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, as- essment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		Unacceptable	4.0		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Release Source:		Samples of the air, landfill leachate, and sediment were taken			
Disposal /Treatment Method:		landfill			
Environmental Media:		Water, Air, Land			
Release or Emission Factor:		Air - 0.013 to 0.18 ng/m3 Water - 3 to 9 ng/LSediment - <0.1 ug/kg dry weight			
Release Estimation Method:		Concentration in the sediment, water, and air			
Number of Sites:		1			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Remberger, M.,Sternbeck, J.,Palm, A.,Kaj, L.,Strömberg, K.,Brorström-Lundén, E.. 2004. The environmental occurrence of hexabromocyclododecane in Sweden. Chemosphere.				
Data Type	Release; Use; Textile industry; Monitoring Data;				
Hero ID	1927826				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability	Metric 1: Methodology	Acceptable	3	Data from trusted source	
Domain 2: Representative	Metric 2: Geographic Scope	Acceptable	3	Sweden	
	Metric 3: Applicability	Unacceptable	4	Information related to out-of-scope scenario and not to engineering assessment	
	Metric 4: Temporal Representativeness	Acceptable	3	2004	
	Metric 5: Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity	Metric 6: Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		Unacceptable	4.0		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Release Source:		Fish samples were taken up stream and down stream from a Swedish textile facility. Air samples were take 350 meters from the facility. Surface sediment samples were taken along the river (both upstream and downstream of the facility)			
Environmental Media:		Water, Air, Land			
Release or Emission Factor:		Air - 0.019 to 0.74 ng/m3 Water - 31 ng/LSediment - <0.1 to 25 ug/kg dry weightFish - 65 to 1,800 ug/kg dry weightSewage sludge - 30 to 33 ug/kg dry weight			
Release Estimation Method:		Concentration in the sediment, water, air, and sewage sludge			
Number of Sites:		1			
Continued on next page					

– continued from previous page

Study Citation:	Remberger, M.,Sternbeck, J.,Palm, A.,Kaj, L.,Strömberg, K.,Brorström-Lundén, E.. 2004. The environmental occurrence of hexabromocyclododecane in Sweden. Chemosphere.			
Data Type	Release; Use; Textile industry; Monitoring Data;			
Hero ID	1927826			
Domain	Metric	Rating	Score	Comments

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Rauert, C.,Lazarov, B.,Harrad, S.,Covaci, A.,Stranger, M.. 2014. A review of chamber experiments for determining specific emission rates and investigating migration pathways of flame retardants. Atmospheric Environment.				
Data Type	Release; Commercial Use; Insulation boards ; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	2343745				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	UK	
Metric 3:	Applicability	Acceptable	3	Potentially can be applied to occupational scenario (use of insulation in offices).	
Metric 4:	Temporal Representativeness	Acceptable	3	2013	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		High	1.6		
Extracted		Yes			
<div>EXTRACTION</div>					
Parameter		Data			
Release Source:		Insulation board use was modeled in a chamber in another study (Kemmler et al., 2003)			
Release or Emission Factor:		0.0004 to 0.0029 ug/m2h			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Kuo, Y. uY,Zhang, H.,Gerecke, A. C.,Wang, J.. 2014. Chemical Composition of Nanoparticles Released from Thermal Cutting of Polystyrene Foams and the Associated Isomerization of Hexabromocyclododecane (HBCD) Diastereomers. Aerosol and Air Quality Research.				
Data Type	Release; Processing; EPS Thermal Cutting; Completed Exposure or Risk Assessments;				
Hero ID	2674624				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability	Metric 1: Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative	Metric 2: Geographic Scope	Acceptable	3	Switzerland	
	Metric 3: Applicability	Acceptable	3	Information related to in-scope scenario	
	Metric 4: Temporal Representativeness	Acceptable	3	2013	
	Metric 5: Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity	Metric 6: Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		High	1.6		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Release Source:		From 1 hour long experiments cutting EPS foam			
Release or Emission Factor:		5.2 mg particles containing 160 ug HBCD per hour			
Release Estimation Method:		measured			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Kuo, Y. uY,Zhang, H.,Gerecke, A. C.,Wang, J.. 2014. Chemical Composition of Nanoparticles Released from Thermal Cutting of Polystyrene Foams and the Associated Isomerization of Hexabromocyclododecane (HBCD) Diastereomers. Aerosol and Air Quality Research.				
Data Type	Release; Processing; XPS Thermal Cutting; Completed Exposure or Risk Assessments;				
Hero ID	2674624				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Switzerland	
Metric 3:	Applicability	Acceptable	3	Information related to in-scope scenario	
Metric 4:	Temporal Representativeness	Acceptable	3	2013	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		High	1.6		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Release Source:		From 1 hour long experiments cutting XPS foam			
Release or Emission Factor:		4.5 mg particles containing 250 ug HBCD per hour			
Release Estimation Method:		measured			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Rauert, C.,Lazarov, B.,Harrad, S.,Covaci, A.,Stranger, M.. 2014. A review of chamber experiments for determining specific emission rates and investigating migration pathways of flame retardants. Atmospheric Environment.				
Data Type	Release; Commercial Use; Insulation in Office; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	2343745				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	UK	
Metric 3:	Applicability	Acceptable	3	Occupational scenario (use of insulation in offices).	
Metric 4:	Temporal Representativeness	Acceptable	3	2013	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, as- sessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		High	1.6		
Extracted		Yes			
Parameter		EXTRACTION Data			
Release Source:		Emission test in chamber			
Environmental Media:		Offices			
Release or Emission Factor:		300 ng/g HBCD in dust			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Rauert, C.,Lazarov, B.,Harrad, S.,Covaci, A.,Stranger, M.. 2014. A review of chamber experiments for determining specific emission rates and investigating migration pathways of flame retardants. Atmospheric Environment.				
Data Type	Release; Consumer Use; Insulation in homes; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	2343745				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	UK	
Metric 3:	Applicability	Unacceptable	4	Non-occupational scenario (in homes). No associated workers.	
Metric 4:	Temporal Representativeness	Acceptable	3	2013	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		Unacceptable	4.0		
Extracted		Yes			
Parameter		EXTRACTION Data			
Release Source:		Emission test in chamber			
Environmental Media:		Houses			
Release or Emission Factor:		100 ng/g HBCD in dust			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Rauert, C.,Lazarov, B.,Harrad, S.,Covaci, A.,Stranger, M.. 2014. A review of chamber experiments for determining specific emission rates and investigating migration pathways of flame retardants. Atmospheric Environment.				
Data Type	Release; Consumer Use; Insulation in homes; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	2343745				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	UK	
Metric 3:	Applicability	Unacceptable	4	Non-occupational scenario (in homes). No associated workers.	
Metric 4:	Temporal Representativeness	Acceptable	3	2013	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		Unacceptable	4.0		
Extracted		Yes			
Parameter		EXTRACTION Data			
Release Source:		Emission test in chamber			
Environmental Media:		Near electronic equipment (5 meters from TV)			
Release or Emission Factor:		5,700 to 24,000 ng/g HBCD in dust			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Kuo, Y. uY,Zhang, H.,Gerecke, A. C.,Wang, J.. 2014. Chemical Composition of Nanoparticles Released from Thermal Cutting of Polystyrene Foams and the Associated Isomerization of Hexabromocyclododecane (HBCD) Diastereomers. Aerosol and Air Quality Research.				
Data Type	Release; Processing; EPS Thermal Cutting; Completed Exposure or Risk Assessments;				
Hero ID	2674624				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Switzerland	
Metric 3:	Applicability	Acceptable	3	Information related to in-scope scenario	
Metric 4:	Temporal Representativeness	Acceptable	3	2013	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		High	1.6		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Release Source:		From 1 hour long experiments cutting EPS foam			
Release or Emission Factor:		15 - 40 mg/g for specified particle size range			
Release Estimation Method:		10 - 1,000 nm (HBCD was the highest concentrations for these size particles)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Kuo, Y. uY,Zhang, H.,Gerecke, A. C.,Wang, J.. 2014. Chemical Composition of Nanoparticles Released from Thermal Cutting of Polystyrene Foams and the Associated Isomerization of Hexabromocyclododecane (HBCD) Diastereomers. Aerosol and Air Quality Research.				
Data Type	Release; Processing; XPS Thermal Cutting; Completed Exposure or Risk Assessments;				
Hero ID	2674624				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Switzerland	
Metric 3:	Applicability	Acceptable	3	Information related to in-scope scenario	
Metric 4:	Temporal Representativeness	Acceptable	3	2013	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination *		High	1.6		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Release Source:		From 1 hour long experiments cutting XPS foam			
Release or Emission Factor:		20 - 60 mg HBCD/g particle generated, for specified particle size range			
Release Estimation Method:		10 - 1,000 nm (HBCD was the highest concentrations for these size particles)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Ni, H. G.,Lu, S. Y.,Mo, T.,Zeng, H.. 2016. Brominated flame retardant emissions from the open burning of five plastic wastes and implications for environmental exposure in China. Environmental Pollution.				
Data Type	Release; Disposal; Incineration of plastic wastes; Environmental Release Data;				
Hero ID	3350474				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Unacceptable	4	China	
Metric 3:	Applicability	Acceptable	3	disposal in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2016	
Metric 5:	Sample Size	Acceptable	3	Statistical distribution of samples is fully characterized.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	data include all associated metadata,	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.4		
Extracted		Yes			
Parameter		EXTRACTION			
		Data			
Release Source:		Two incineration plants in China			
Disposal /Treatment Method:		airborne particle (51 percent), followed by residualash (44 percent) and the gas phase (5.1 percent);			
Environmental Media:		air			
Release or Emission Factor:		airborne particle - 26.8 to 5,290 ng HBCD/g plastic wasteresidual ash - 4.9 to 77.1 ng HBCD/g plastic wastegas phase - 10.2 to 17.1 ng HBCD/g plastic waste			
Release Estimation Method:		Measured			
Annual Release Quantity (kg/yr):		25.5 kg/yr			
Number of Sites:		2			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Ni, H. G.,Lu, S. Y.,Mo, T.,Zeng, H.. 2016. Brominated flame retardant emissions from the open burning of five plastic wastes and implications for environmental exposure in China. Environmental Pollution.				
Data Type	Release; Disposal; Incineration of plastic wastes; Environmental Release Data;				
Hero ID	3350474				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Unacceptable	4	China	
Metric 3:	Applicability	Acceptable	3	disposal in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2016	
Metric 5:	Sample Size	Acceptable	3	Statistical distribution of samples is fully characterized.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	data include all associated metadata,	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.4		
Extracted		Yes			
Parameter		EXTRACTION			
		Data			
Release Source:		Two incineration plants in China			
Disposal /Treatment Method:		airborne particle (51 percent), followed by residualash (44 percent) and the gas phase (5.1 percent);			
Environmental Media:		land			
Release or Emission Factor:		airborne particle - 26.8 to 5,290 ng HBCD/g plastic wasteresidual ash - 4.9 to 77.1 ng HBCD/g plastic wastegas phase - 10.2 to 17.1 ng HBCD/g plastic waste			
Release Estimation Method:		Measured			
Annual Release Quantity (kg/yr):		71.7 kg/yr			
Number of Sites:		2			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Li, L.,Weber, R.,Liu, J.,Hu, J.. 2016. Long-term emissions of hexabromocyclododecane as a chemical of concern in products in China. Environment International.				
Data Type	Release; Manufacturing; HBCD production; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3350476				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information compiled from several different sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Unacceptable	4	China	
Metric 3:	Applicability	Acceptable	3	Manufacturing not in scope but maybe can be applied to importation	
Metric 4:	Temporal Representativeness	Acceptable	3	2016	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Data sources are generally described but not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination *		Medium	2.1		
Extracted		Yes			
Parameter		EXTRACTION Data			
Release Source:		All releases were modeled from previous risk assessments, reports, and China's HBCD industry data			
Release or Emission Factor:		3.30E-07			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Li, L.,Weber, R.,Liu, J.,Hu, J.. 2016. Long-term emissions of hexabromocyclododecane as a chemical of concern in products in China. Environment International.				
Data Type	Release; Processing; EPS Foam; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3350476				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability	Metric 1: Methodology	Acceptable	3	Information compiled from several different sources	
Domain 2: Representative	Metric 2: Geographic Scope	Unacceptable	4	China	
	Metric 3: Applicability	Acceptable	3	in scope	
	Metric 4: Temporal Representativeness	Acceptable	3	2016	
	Metric 5: Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity	Metric 6: Metadata Completeness	Acceptable	3	Data sources are generally described but not fully transparent.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination *		Medium	1.9		
Extracted		Yes			
Parameter		EXTRACTION Data			
Release Source:		All releases were modeled from previous risk assessments, reports, and China’s HBCD industry data			
Release or Emission Factor:		5.2E-6 to 3.3E-5			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Li, L.,Weber, R.,Liu, J.,Hu, J.. 2016. Long-term emissions of hexabromocyclododecane as a chemical of concern in products in China. Environment International.				
Data Type	Release; Processing; XPS Foam; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3350476				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information compiled from several different sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Unacceptable	4	China	
Metric 3:	Applicability	Acceptable	3	in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2016	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Data sources are generally described but not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		Medium	1.9		
Extracted		Yes			
Parameter	EXTRACTION Data				
Release Source:	All releases were modeled from previous risk assessments, reports, and China's HBCD industry data				
Release or Emission Factor:	6.9E-6 to 1.7E-5				

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Li, L.,Weber, R.,Liu, J.,Hu, J.. 2016. Long-term emissions of hexabromocyclododecane as a chemical of concern in products in China. Environment International.				
Data Type	Release; Processing; Textiles; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3350476				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information compiled from several different sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Unacceptable	4	China	
Metric 3:	Applicability	Unacceptable	4	Out of scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2016	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Data sources are generally described but not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination *		Unacceptable	4.0		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Release Source:		All releases were modeled from previous risk assessments, reports, and China’s HBCD industry data			
Release or Emission Factor:		7.0E-6 to 7.3E-6			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Li, L.,Weber, R.,Liu, J.,Hu, J.. 2016. Long-term emissions of hexabromocyclododecane as a chemical of concern in products in China. Environment International.				
Data Type	Release; Consumer Use; EPS, XPS, or textiles; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3350476				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information compiled from several different sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Unacceptable	4	China	
Metric 3:	Applicability	Unacceptable	4	Out of scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2016	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Data sources are generally described but not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination *		Unacceptable	4.0		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Release Source:		All releases were modeled from previous risk assessments, reports, and China's HBCD industry data			
Release or Emission Factor:		5.8E-8 to 1.4E-4			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Li, L.,Weber, R.,Liu, J.,Hu, J.. 2016. Long-term emissions of hexabromocyclododecane as a chemical of concern in products in China. Environment International.				
Data Type	Release; Disposal; Demolition, recycling, landfill, or incineration of products containing HBCD; Reports for Data or Information Other than Exposure or Release				
Hero ID	3350476				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information compiled from several different sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Unacceptable	4	China	
Metric 3:	Applicability	Acceptable	3	in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2016	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Data sources are generally described but not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		Medium	1.9		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Release Source:		All releases were modeled from previous risk assessments, reports, and China's HBCD industry data			
Release or Emission Factor:		1.0E-6 to 9.0E-5			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Takigami, H.,Watanabe, M.,Kajiwara, N.. 2014. Destruction behavior of hexabromocyclododecanes during incineration of solid waste containing expanded and extruded polystyrene insulation foams. Chemosphere.				
Data Type	Release; Disposal; EPS and XPS insulation; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	2343703				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Japan	
Metric 3:	Applicability	Acceptable	3	in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2014	
Metric 5:	Sample Size	Acceptable	3	Study contains all sampling data results, from which statistics can be surmised	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	well characterized	
Overall Quality Determination*		High	1.1		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Release Source:		EPS and XPS materials were respectively blended with refuse derived fuel (RDF) as input wastes for incineration. Concentrations of HBCDs contained in the EPS- and XPS-added RDFs, were 140 and 1100 mg kg 1, respectively.			
Disposal /Treatment Method:		Incineration destruction experiment			
Waste Treatment Method:		During the incineration experiments with EPS and XPS, primary and secondary combustion zones were maintained at temperatures of 840 C and 900 C. The residence times of waste in the primary combustion zone and flue gas in the secondary combustion zone was 30 min and three seconds, respectively.			
Continued on next page					

– continued from previous page

Study Citation:	Takigami, H.,Watanabe, M.,Kajiware, N.. 2014. Destruction behavior of hexabromocyclododecanes during incineration of solid waste containing expanded and extruded polystyrene insulation foams. Chemosphere.				
Data Type	Release; Disposal; EPS and XPS insulation; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	2343703				
Domain	Metric	Rating	Score	Comments	
P2 Control & percent Efficiency:				Concentration levels of the total HBCDs in the bag filter exit gas for the two experiments with EPS and XPS were 0.7 and 0.6 ng/m3, respectively. HBCDs were also not detected (<0.2 ng/g) in the bottom and fly ash samples. From the obtained results, it was calculated that HBCDs were sufficiently destroyed in the whole incineration process with destruction efficiencies of more than 99.9999 for both of EPS and XPS cases.	

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High= ≥ 1 to < 1.7; Medium = ≥ 1.7 to < 2.4; Low = ≥ 2.4 to < 3.

Study Citation:	Stubbings, W. A.,Kajiwara, N.,Takigami, H.,Harrad, S.. 2016. Leaching behaviour of hexabromocyclododecane from treated curtains. Chemosphere.				
Data Type	Release; Disposal; Textiles; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3162362				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Japan	
Metric 3:	Applicability	Unacceptable	4	Out of scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2016	
Metric 5:	Sample Size	Acceptable	3	Study contains all sampling data results, from which statistics can be surmised	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	well characterized	
Overall Quality Determination *		Unacceptable	4.0		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Release Source:		HBCD into leachate			
Disposal /Treatment Method:		landfill			
Release Estimation Method:		Concentration of HBCD in leachate in which textiles were submerged was measured over time			
Annual Release Quantity (kg/yr):		310,000 tonnes of textiles are disposed of by householders annually			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Guerra, P.,De La Cal, A.,Marsh, G.,Eljarrat, E.,Barcelo, D.. 2009. Transfer of hexabromocyclododecane from industrial effluents to sediments and biota: Case study in Cinca river (Spain). Journal of Hydrology.				
Data Type	Release; Processing; EPS resin mfg; Environmental Release Data;				
Hero ID	3575325				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	does not cover all release sources at the site	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Spain	
Metric 3:	Applicability	Unacceptable	4	This use is out of scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2009	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	includes release media but no other metadata	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		Unacceptable	4.0		
Extracted		Yes			
Parameter		EXTRACTION Data			
Environmental Media:		surface water			
Release or Emission Factor:		2 ug HBCD/L wastewater effluent			
Release Estimation Method:		sampled in WW effluent			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Oecd., 2007. SIDS initial assessment profile: Hexabromocyclododecane (HBCDD).			
Data Type	Release; All; All; Reports for Data or Information Other than Exposure or Release Data;			
Hero ID	3809146			
Domain	Metric	Rating	Score	Comments
Domain 1: Reliability				
Metric 1:	Methodology	Acceptable	3	The assessment or report uses high quality data and/or techniques that are not from trusted sources; however, Associated information does not indicate flaws or quality issues.
Domain 2: Representative				
Metric 2:	Geographic Scope	Acceptable	3	EU
Metric 3:	Applicability	Acceptable	3	Information is not from a particular scenario, but can be applied to in-scope uses
Metric 4:	Temporal Representativeness	Acceptable	3	2007
Metric 5:	Sample Size	N/A	N/A	This metric is not applicable to this data type. This figure was obtained from a model
Domain 3: Accessibility/Clarity				
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.
Domain 4: Variability and Uncertainty				
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty
Overall Quality Determination *		Medium	2.2	
Extracted		Yes		
EXTRACTION				
Parameter		Data		
Release Estimation Method:		EUSES model		
Waste Treatment Method:		wastewater treatment		
P2 Control & percent Efficiency:		overall HBCD removal at WWTP of 80 percent ; The major part is expected to be adsorbed to the sludge		

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Priddy, D. B.,et al.,. 2000. Kirk-Othmer Encyclopedia of Chemical TechnologyStyrene plastics.				
Data Type	Release; All; Styrene Plastics; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3981049				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	US	
Metric 3:	Applicability	Unacceptable	4	Toxicity information is relevant to the Risk Assessment, but is not utilized by the engineering assessors	
Metric 4:	Temporal Representativeness	Unacceptable	4	No Date (earliest sources from 1996)	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		Unacceptable	4.0		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Release Source:		Does not mention HBCD but describes the chemical and physical properties of styrene plastics in detail.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High = ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2009. Data on manufacture, import, export, uses and releases of HBCDD as well as information on potential alternatives to its use.				
Data Type	Release; All; All; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3809166				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Multiple European countries	
Metric 3:	Applicability	Acceptable	3	Provides infomration on both in-scope and out of scope uses.	
Metric 4:	Temporal Representativeness	Acceptable	3	2009	
Metric 5:	Sample Size	Acceptable	3	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	discussion of variability or uncertainty	
Overall Quality Determination *		High	1.4		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Release Source:		Summarizes releases that are presented in the EURAR (HERO ID 3970747)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Exposure

Study Citation:	Thomsen, C.,Molander, P.,Daae, H. L.,Janák, K.,Froshaug, M.,Liane, V. H.,Thorud, S.,Becher, G.,Dybing, E.. 2007. Occupational exposure to hexabromocyclododecane at an industrial plant. Environmental Science and Technology.				
Data Type	Exposure; Processing; EPS Resin production; Monitoring Data;				
Hero ID	787728				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	A certified occupationalhygienist from the company”s OccupationalHealth Service executed the practical air sampling accordingto a detailed protocol.	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	A Scandanavian Industrial Plant . Since all scandanavian countries (Sweden, Denmark, Finland, Norway, Iceland) are in OECD this score is a 2	
Metric 3:	Applicability	Acceptable	3	Manufacturing EPS is not in scope, but some information may be applicable to other scenarios that are in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	The report was published in 2007 (> 10 years ago)	
Metric 5:	Sample Size	Unacceptable	4	Statistics of the sampling is not discussed.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	All pertinent monitoring data is provided.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination *		Medium	2.0		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Physical Form:		Dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		0.24 ug/m3 - 150 ug/m3 (mean - 12.2 ug/m3; median - 2.1 ug/m3)			
Number of Samples:		30			
Number of Sites:		1			
Type of Measurement or Method:		8-hr TWA			
Worker Activity:		24 samples were taken for reactor working procedures and 6 were taken from mixer working procedures.			
Continued on next page					

– continued from previous page

Study Citation:	Thomsen, C.,Molander, P.,Daae, H. L.,Janák, K.,Froshaug, M.,Liane, V. H.,Thorud, S.,Becher, G.,Dybing, E.. 2007. Occupational exposure to hexabromocyclododecane at an industrial plant. Environmental Science and Technology.			
Data Type	Exposure; Processing; EPS Resin production; Monitoring Data;			
Hero ID	787728			
Domain	Metric	Rating	Score	Comments
Number of Workers:		10		
Type of Sampling:		Personal breathing zone		
Sampling Location:		Reactor (24 samples) or Mixer (6 samples)		
Exposure Duration:		8-hr		
Exposure Frequency:		14 days at a time (7 day periods of no HBCD used in products)		
Bulk and Dust Particle Size Distribution:		20 nm to 2 mm HBCD particles		

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Abdallah, M. A.,Harrad, S.,Covaci, A.. 2008. Hexabromocyclododecanes and tetrabromobisphenol-A in indoor air and dust in Birmingham, U.K: implications for human exposure. Environmental Science and Technology.				
Data Type	Exposure; Consumer Use; Insulation products in Homes; Monitoring Data;				
Hero ID	1079114				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Describes how the data was modeled from the HBCD dust concentrations	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	UK	
Metric 3:	Applicability	Unacceptable	4	Non-occupational scenario (settled dust in homes). No associated worker activities.	
Metric 4:	Temporal Representativeness	Acceptable	3	Published in 2008 (10 years ago)	
Metric 5:	Sample Size	Acceptable	3	Indicates number of locations but does not specify number of samples at each location. However, provides several statistics of the sample size.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Specific details of studied samples, sampling and analytical-protocols, as well as statistical summaries of concentrationsof individual HBCD in eachsample are available online as well	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination *		Unacceptable	4.0		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Physical Form:		settled dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		67 - 1,300 pg/m3 (mean - 250 pg/m3)			
Number of Sites:		33			
Type of Measurement or Method:		TWA			
Worker Activity:		Modeled data based on HBCD concentration in dust. No associated worker activity.			
Continued on next page					

– continued from previous page

Study Citation:	Abdallah, M. A.,Harad, S.,Covaci, A.. 2008. Hexabromocyclododecanes and tetrabromobisphenol-A in indoor air and dust in Birmingham, U.K: implications for human exposure. Environmental Science and Technology.			
Data Type	Exposure; Consumer Use; Insulation products in Homes; Monitoring Data;			
Hero ID	1079114			
Domain	Metric	Rating	Score	Comments
Sampling Location:	Homes			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Abdallah, M. A.,Harrad, S.,Covaci, A.. 2008. Hexabromocyclododecanes and tetrabromobisphenol-A in indoor air and dust in Birmingham, U.K: implications for human exposure. Environmental Science and Technology.				
Data Type	Exposure; Commerical Use; Insulation products in Offices; Monitoring Data;				
Hero ID	1079114				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Describes how the data was modeled from the HBCD dust concentrations	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	UK	
Metric 3:	Applicability	Unacceptable	4	Occupational scenario (use of insulation in offices). No associated worker activities.	
Metric 4:	Temporal Representativeness	Acceptable	3	Published in 2008 (10 years ago)	
Metric 5:	Sample Size	Acceptable	3	Indicates number of locations but does not specify number of samples at each location. However, provides several statistics of the sample size.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Specific details of studied samples, sampling and analytical-protocols, as well as statistical summaries of concentrationsof individual HBCD in eachsample are available online as well	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination *		Unacceptable	4.0		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Physical Form:		settled dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		70 - 460 pg/m3 (mean - 180 pg/m3)			
Number of Sites:		25			
Type of Measurement or Method:		TWA			
Worker Activity:		Modeled data based on HBCD concentration in dust. No associated worker activity.			
Continued on next page					

– continued from previous page

Study Citation:	Abdallah, M. A.,Harad, S.,Covaci, A.. 2008. Hexabromocyclododecanes and tetrabromobisphenol-A in indoor air and dust in Birmingham, U.K: implications for human exposure. Environmental Science and Technology.			
Data Type	Exposure; Commerical Use; Insulation products in Offices; Monitoring Data;			
Hero ID	1079114			

Domain	Metric	Rating	Score	Comments
Sampling Location:		Offices		

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Abdallah, M. A.,Harrad, S.,Covaci, A.. 2008. Hexabromocyclododecanes and tetrabromobisphenol-A in indoor air and dust in Birmingham, U.K: implications for human exposure. Environmental Science and Technology.				
Data Type	Exposure; Consumer Use; Insulation products in indoor public microenvironments; Monitoring Data;				
Hero ID	1079114				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Describes how the data was modeled from the HBCD dust concentrations	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	UK	
Metric 3:	Applicability	Unacceptable	4	Non-occupational scenario (settled dust in gen pop areas). No associated worker activites.	
Metric 4:	Temporal Representativeness	Acceptable	3	Published in 2008 (10 years ago)	
Metric 5:	Sample Size	Acceptable	3	Indicates number of locations but does not specify number of samples at each location. However, provides several statistics of the sample size.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Specific details of studied samples, sampling and analytical-protocols, as well as statistical summaries of concentrationsof individual HBCD in eachsample are available online as well	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination *		Unacceptable	4.0		
Extracted		Yes			
Parameter		EXTRACTION Data			
Physical Form:		settled dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		820- 960 pg/m3 (mean - 900 pg/m3)			
Number of Sites:		4			
Type of Measurement or Method:		TWA			
Worker Activity:		Modeled data based on HBCD concentration in dust. No associated worker activity.			
Continued on next page					

– continued from previous page

Study Citation:	Abdallah, M. A.,Harad, S.,Covaci, A.. 2008. Hexabromocyclododecanes and tetrabromobisphenol-A in indoor air and dust in Birmingham, U.K: implications for human exposure. Environmental Science and Technology.			
Data Type	Exposure; Consumer Use; Insulation products in indoor public microenvironments; Monitoring Data;			
Hero ID	1079114			
Domain	Metric	Rating	Score	Comments
Sampling Location:	Public Microenvironments			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Abdallah, M. A.,Harrad, S.,Covaci, A.. 2008. Hexabromocyclododecanes and tetrabromobisphenol-A in indoor air and dust in Birmingham, U.K: implications for human exposure. Environmental Science and Technology.				
Data Type	Exposure; Consumer Use; Outdoor Air; Monitoring Data;				
Hero ID	1079114				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Describes how the data was modeled from the HBCD dust concentrations	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	UK	
Metric 3:	Applicability	Unacceptable	4	Non-occupational scenario (outdoor air dust in gen pop areas). No associated worker activites.	
Metric 4:	Temporal Representativeness	Acceptable	3	Published in 2008 (10 years ago)	
Metric 5:	Sample Size	Acceptable	3	Indicates number of locations but does not specify number of samples at each location. However, provides several statistics of the sample size.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Specific details of studied samples, sampling and analytical-protocols, as well as statistical summaries of concentrationsof individual HBCD in eachsample are available online as well	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination *		Unacceptable	4.0		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Physical Form:		Dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		34 - 40 pg/m3 (mean - 37 pg/m3)			
Number of Sites:		5			
Type of Measurement or Method:		TWA			
Worker Activity:		Modeled data based on HBCD concentration in dust. No associated worker activity.			
Continued on next page					

– continued from previous page

Study Citation:	Abdallah, M. A.,Harrad, S.,Covaci, A.. 2008. Hexabromocyclododecanes and tetrabromobisphenol-A in indoor air and dust in Birmingham, U.K: implications for human exposure. Environmental Science and Technology.			
Data Type	Exposure; Consumer Use; Outdoor Air; Monitoring Data;			
Hero ID	1079114			
Domain	Metric	Rating	Score	Comments
Sampling Location:	Outdoor Air			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Abdallah, M. A.,Harrad, S.,Covaci, A.. 2008. Hexabromocyclododecanes and tetrabromobisphenol-A in indoor air and dust in Birmingham, U.K: implications for human exposure. Environmental Science and Technology.				
Data Type	Exposure; Consumer Use; Indoor Air; Monitoring Data;				
Hero ID	1079114				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Describes how the data was modeled from the HBCD dust concentrations	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	UK	
Metric 3:	Applicability	Unacceptable	4	Non-occupational scenario (outdoor air dust in gen pop areas). No associated worker activites.	
Metric 4:	Temporal Representativeness	Acceptable	3	Published in 2008 (10 years ago)	
Metric 5:	Sample Size	Acceptable	3	Indicates number of locations but does not specify number of samples at each location. However, provides several statistics of the sample size.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Only includes amount in dust (essentially an HBCD concentration)	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		Unacceptable	4.0		
Extracted		Yes			
Parameter		EXTRACTION Data			
Physical Form:		Dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		90 ng/g - 140,000 ng/g (mean - 8,300 ng/g)			
Number of Sites:		97			
Type of Measurement or Method:		Concentration in dust			
Worker Activity:		HBCDs found from several products used in indoor environments. No associated worker activity.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	ToxNet Hazardous Substances Data, Bank. 2017. HSDB: Hexabromocyclododecane.				
Data Type	Exposure; Import; Import; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3970277				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	US	
Metric 3:	Applicability	Acceptable	3	Importation is in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2012	
Metric 5:	Sample Size	Acceptable	3	Information is from 3 CDR reporting sites, which represents only the sites exceeding the reporting threshold, so maybe not every possible site	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Report addresses CBI claims, but not much else	
Overall Quality Determination *		High	1.2		
Extracted		Yes			
<div>EXTRACTION</div>					
Parameter		Data			
Worker Activity:		Workers at importation and manufacturing sites per 2012 CDR			
Number of Workers:		<10 to 25-49 workers per site			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Nicnas,. 2012. Priority existing chemical assessments: Hyexabromocyclododecane (HBCD)- PEC34.			
Data Type	Exposure; Commerical Use; Insulation products in Offices; Completed Exposure or Risk Assessments;			
Hero ID	3978355			
Domain	Metric	Rating	Score	Comments
Domain 1: Reliability				
Metric 1:	Methodology	Acceptable	3	Information collected from journal studies
Domain 2: Representative				
Metric 2:	Geographic Scope	Acceptable	3	UK, Belgium
Metric 3:	Applicability	Unacceptable	4	Occupational scenario (use of insulation in offices). No associated worker activities.
Metric 4:	Temporal Representativeness	Acceptable	3	2008-2010
Metric 5:	Sample Size	Acceptable	3	Mean and median provided, no other statistics. 16 samples, unknown # of sites
Domain 3: Accessibility/Clarity				
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited
Domain 4: Variability and Uncertainty				
Metric 7:	Metadata Completeness	Acceptable	3	Limited discussion on uncertainty and variability
Overall Quality Determination *		Unacceptable	4.0	
Extracted		Yes		
EXTRACTION				
Parameter	Data			
Physical Form:	settled dust			
Route of Exposure:	Inhalation			
Exposure Concentration (Unit):	Mean = 1400 ug/kg dust, Median = 650 ug/kg dust (UK); Mean = 592 ug/kg dust, Median = 367 ug/kg dust (Belgium)			
Number of Samples:	16			
Number of Sites:	Unknown (>10)			
Type of Measurement or Method:	HBCD concentration in dust was measured and exposure was calculated with assumptions. See assumptions on page 59.			
Worker Activity:	Office workers. No associated worker activity.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Nicnas,. 2012. Priority existing chemical assessments: Hyexabromocyclododecane (HBCD)- PEC34.				
Data Type	Exposure; Import; Import; Completed Exposure or Risk Assessments;				
Hero ID	3978355				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Based on accepted model from Europe	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Australia	
Metric 3:	Applicability	Acceptable	3	Use in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2012	
Metric 5:	Sample Size	Acceptable	3	Model - uncertainty provided, distribution of results provided	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Uncertainty and variability discussion provided	
Overall Quality Determination*		High	1.1		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Physical Form:		Dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		0.20.5 mg/m3 (typical); 0.55 mg/m3 (worst case)			
Type of Measurement or Method:		Modelled (section 6.4)			
Worker Activity:		repackaging into smaller pack sizes or in the event of an accident or spill			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Nicnas,. 2012. Priority existing chemical assessments: Hyexabromocyclododecane (HBCD)- PEC34.				
Data Type	Exposure; Import; Import; Completed Exposure or Risk Assessments;				
Hero ID	3978355				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Based on accepted model from Europe	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Australia	
Metric 3:	Applicability	Acceptable	3	Use in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2012	
Metric 5:	Sample Size	Acceptable	3	Model - uncertainty provided, distribution of results provided	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Uncertainty and variability discussion provided	
Overall Quality Determination*		High	1.1		
Extracted		Yes			
<div>EXTRACTION</div>					
Parameter		Data			
Physical Form:		Dust			
Route of Exposure:		Dermal			
Exposure Concentration (Unit):		57570 ?g/kg bw/d (powder); 29290 ?g/kg bw/d (granules)			
Type of Measurement or Method:		Modelled (section 6.4)			
Worker Activity:		repackaging into smaller pack sizes or in the event of an accident or spill			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	Nicnas,. 2012. Priority existing chemical assessments: Hyexabromocyclododecane (HBCD)- PEC34.				
Data Type	Exposure; Processing; EPS compounding; Completed Exposure or Risk Assessments;				
Hero ID	3978355				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information collected from surevey respondents	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Australia	
Metric 3:	Applicability	Acceptable	3	Manufacturing EPS is not in scope, but some information may be applicable to other scenarios that are in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2012	
Metric 5:	Sample Size	Acceptable	3	Results from 1 respndent	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion	
Overall Quality Determination*		High	1.7		
Extracted		Yes			
Parameter		EXTRACTION Data			
Physical Form:		Dust			
Type of Measurement or Method:		respondents from survey			
Worker Activity:		Adding HBCD to the mixture			
Number of Workers:		1			
Exposure Duration:		10 min/day			
Exposure Frequency:		180 days/yr			
Bulk and Dust Particle Size Distribution:		2 mm granules or 50-60 um powder			
Engineering Control & percent Exposure Reduction:		LEV			
PPE:		Overalls, safety glasses, leather or chemical resistant gloves, dust masks and respirators			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Nicnas,. 2012. Priority existing chemical assessments: Hyexabromocyclododecane (HBCD)- PEC34.				
Data Type	Exposure; Processing; EPS compounding; Completed Exposure or Risk Assessments;				
Hero ID	3978355				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Results extracted from a study in Scotland	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Scotland	
Metric 3:	Applicability	Acceptable	3	Manufacturing EPS is not in scope, but some information may be applicable to other scenarios that are in scope or may be used as surrogate data	
Metric 4:	Temporal Representativeness	Acceptable	3	2005	
Metric 5:	Sample Size	Acceptable	3	Statistical distribution provided; Sample size provided and seems sufficient	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Uncertainty and variability discussion provided	
Overall Quality Determination*		High	1.6		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Physical Form:		Dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		2.89-21.5 mg/m3			
Number of Samples:		12			
Number of Sites:		2			
Type of Measurement or Method:		Short-term			
Worker Activity:		Adding HBCD powder to the mixture			
Type of Sampling:		personal			
Exposure Duration:		13-56 mins			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Nicnas,. 2012. Priority existing chemical assessments: Hyexabromocyclododecane (HBCD)- PEC34.				
Data Type	Exposure; Processing; EPS compounding; Completed Exposure or Risk Assessments;				
Hero ID	3978355				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Results extracted from a study in Scotland	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Scotland	
Metric 3:	Applicability	Acceptable	3	Manufacturing EPS is not in scope, but some information may be applicable to other scenarios that are in scope or may be used as surrogate data	
Metric 4:	Temporal Representativeness	Acceptable	3	2005	
Metric 5:	Sample Size	Acceptable	3	Statistical distribution provided; Sample size provided and seems sufficient	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Uncertainty and variability discussion provided	
Overall Quality Determination*		High	1.6		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Physical Form:		Dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		0.12-3.36 mg/m3			
Number of Samples:		12			
Number of Sites:		2			
Type of Measurement or Method:		8 hr TWA			
Worker Activity:		Adding HBCD powder to the mixture			
Type of Sampling:		personal			
Exposure Duration:		480 mins			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Nicnas,. 2012. Priority existing chemical assessments: Hyexabromocyclododecane (HBCD)- PEC34.				
Data Type	Exposure; Processing; EPS compounding; Completed Exposure or Risk Assessments;				
Hero ID	3978355				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Results extracted from a study in Scotland	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Scotland	
Metric 3:	Applicability	Acceptable	3	Manufacturing EPS is not in scope, but some information may be applicable to other scenarios that are in scope or may be used as surrogate data	
Metric 4:	Temporal Representativeness	Acceptable	3	2005	
Metric 5:	Sample Size	Acceptable	3	Statistical distribution provided; Sample size provided and seems sufficient	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Uncertainty and variability discussion provided	
Overall Quality Determination*		High	1.6		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Physical Form:		Dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		0.07-14.7 mg/m3			
Number of Samples:		18			
Number of Sites:		3			
Type of Measurement or Method:		full-shift			
Worker Activity:		Adding HBCD powder to the mixture			
Type of Sampling:		personal			
Exposure Duration:		275-504 mins			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Nicnas,. 2012. Priority existing chemical assessments: Hyexabromocyclododecane (HBCD)- PEC34.				
Data Type	Exposure; Processing; EPS compounding; Completed Exposure or Risk Assessments;				
Hero ID	3978355				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Results extracted from a study in Scotland	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Scotland	
Metric 3:	Applicability	Acceptable	3	Manufacturing EPS is not in scope, but some information may be applicable to other scenarios that are in scope or may be used as surrogate data	
Metric 4:	Temporal Representativeness	Acceptable	3	2005	
Metric 5:	Sample Size	Acceptable	3	Statistical distribution provided; Sample size provided and seems sufficient	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Uncertainty and variability discussion provided	
Overall Quality Determination*		High	1.6		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Physical Form:		Dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		4.35-12.1 mg/m3			
Number of Samples:		4			
Number of Sites:		2			
Type of Measurement or Method:		full-shift			
Worker Activity:		Weighing HBCD powder before addition			
Type of Sampling:		personal			
Exposure Duration:		124-350 mins			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Nicnas,. 2012. Priority existing chemical assessments: Hyexabromocyclododecane (HBCD)- PEC34.				
Data Type	Exposure; Processing; XPS production; Completed Exposure or Risk Assessments;				
Hero ID	3978355				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Results extracted from journal article	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Use in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2001	
Metric 5:	Sample Size	Acceptable	3	Statistical distribution provided; Sample size provided and seems sufficient	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Limited discussion on uncertainty	
Overall Quality Determination *		High	1.4		
Extracted		Yes			
Parameter		EXTRACTION Data			
Physical Form:		Dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		2-880 ug/m3			
Number of Samples:		17			
Number of Sites:		6			
Type of Measurement or Method:		full-shift			
Worker Activity:		area sampling at feed deck			
Type of Sampling:		area			
Sampling Location:		feed deck			
Exposure Duration:		4.4-23.9 hours			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Nicnas,. 2012. Priority existing chemical assessments: Hyexabromocyclododecane (HBCD)- PEC34.				
Data Type	Exposure; Processing; XPS production; Completed Exposure or Risk Assessments;				
Hero ID	3978355				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Results extracted from journal article	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Use in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2001	
Metric 5:	Sample Size	Acceptable	3	Statistical distribution provided; Sample size provided and seems sufficient	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Limited discussion on uncertainty	
Overall Quality Determination *		High	1.4		
Extracted		Yes			
Parameter		EXTRACTION Data			
Physical Form:		Dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		3-15 ug/m3			
Number of Samples:		9			
Number of Sites:		6			
Type of Measurement or Method:		Short-term			
Worker Activity:		routine work			
Type of Sampling:		personal			
Exposure Duration:		3-7.3 hrs			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Nicnas,. 2012. Priority existing chemical assessments: Hyexabromocyclododecane (HBCD)- PEC34.				
Data Type	Exposure; Processing; XPS production; Completed Exposure or Risk Assessments;				
Hero ID	3978355				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Results extracted from journal article	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Use in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2001	
Metric 5:	Sample Size	Acceptable	3	Statistical distribution provided; Sample size provided and seems sufficient	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Limited discussion on uncertainty	
Overall Quality Determination *		High	1.4		
Extracted		Yes			
Parameter		EXTRACTION Data			
Physical Form:		Dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		40 ug/m3			
Number of Samples:		6			
Number of Sites:		6			
Type of Measurement or Method:		Short-term			
Worker Activity:		cleaning feed deck			
Type of Sampling:		personal			
Exposure Duration:		1 hr			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Nicnas,. 2012. Priority existing chemical assessments: Hyexabromocyclododecane (HBCD)- PEC34.				
Data Type	Exposure; Processing; EPS converting; Completed Exposure or Risk Assessments;				
Hero ID	3978355				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Results extracted from journal article	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Norway	
Metric 3:	Applicability	Acceptable	3	Use in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2007	
Metric 5:	Sample Size	Acceptable	3	Statistical distribution provided; Sample size provided and seems sufficient	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Uncertainty and variability discussion provided	
Overall Quality Determination*		High	1.3		
Extracted		Yes			
Parameter		EXTRACTION Data			
Physical Form:		Dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		Mean = 0.5 ug/m3			
Number of Samples:		6			
Number of Sites:		1			
Type of Measurement or Method:		full-shift			
Number of Workers:		3/shift			
Type of Sampling:		area			
Sampling Location:		mixer room			
Exposure Duration:		8 hr			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Nicnas,. 2012. Priority existing chemical assessments: Hyexabromocyclododecane (HBCD)- PEC34.				
Data Type	Exposure; Processing; EPS converting; Completed Exposure or Risk Assessments;				
Hero ID	3978355				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Results extracted from journal article	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Norway	
Metric 3:	Applicability	Acceptable	3	Use in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2007	
Metric 5:	Sample Size	Acceptable	3	Statistical distribution provided; Sample size provided and seems sufficient	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Uncertainty and variability discussion provided	
Overall Quality Determination *		High	1.3		
Extracted		Yes			
Parameter		EXTRACTION Data			
Physical Form:		Dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		Mean = 15.1 ug/m3			
Number of Samples:		24			
Number of Sites:		1			
Type of Measurement or Method:		full-shift			
Number of Workers:		3/shift			
Type of Sampling:		area			
Sampling Location:		reactor room			
Exposure Duration:		8 hr			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Nicnas,. 2012. Priority existing chemical assessments: Hyexabromocyclododecane (HBCD)- PEC34.				
Data Type	Exposure; Processing; XPS compounding; Completed Exposure or Risk Assessments;				
Hero ID	3978355				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Based on accepted model from Europe	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Australia	
Metric 3:	Applicability	Acceptable	3	Use in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2012	
Metric 5:	Sample Size	Acceptable	3	Model - uncertainty provided, distribution of results provided	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Uncertainty and variability discussion provided	
Overall Quality Determination *		High	1.1		
Extracted		Yes			
		EXTRACTION			
Parameter	Data				
Physical Form:	Dust				
Route of Exposure:	dermal				
Exposure Concentration (Unit):	0.11 mg/cm2/d.				
Type of Measurement or Method:	Modelled (section 6.5)				
Worker Activity:	direct handling and intermittent, non-dispersive use				
* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High=> 1 to < 1.7; Medium => 1.7 to < 2.4; Low => 2.4 to < 3.					

Study Citation:	Nicnas,. 2012. Priority existing chemical assessments: Hyexabromocyclododecane (HBCD)- PEC34.				
Data Type	Exposure; Processing; XPS compounding; Completed Exposure or Risk Assessments;				
Hero ID	3978355				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Based on accepted model from Europe	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Australia	
Metric 3:	Applicability	Acceptable	3	Use in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2012	
Metric 5:	Sample Size	Acceptable	3	Model - uncertainty provided, distribution of results provided	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Uncertainty and variability discussion provided	
Overall Quality Determination*		High	1.1		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Physical Form:		Dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		see table 10.3			
Type of Measurement or Method:		Modelled (section 6.5)			
Worker Activity:		addition and weighing			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	Nicnas,. 2012. Priority existing chemical assessments: Hyexabromocyclododecane (HBCD)- PEC34.				
Data Type	Exposure; All; HBCD in dust; Completed Exposure or Risk Assessments;				
Hero ID	3978355				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Based on accepted model from Europe	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Australia	
Metric 3:	Applicability	Unacceptable	4	Non-occupational exposure that can be applied to occupational	
Metric 4:	Temporal Representativeness	Acceptable	3	2003	
Metric 5:	Sample Size	Acceptable	3	Model - uncertainty provided, distribution of results provided	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Uncertainty and variability discussion provided	
Overall Quality Determination*		Medium	1.8		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Physical Form:		Dust			
Route of Exposure:		Oral to dust			
Exposure Concentration (Unit):		1.9 (typical) to 12 (worst case) ng/kg-day			
Type of Measurement or Method:		Modelled (pg 238)			
Worker Activity:		Exposure to HBCD in indoor soil and dust			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	Haz, Map. 2017. Haz-Map: Agent name: 1,2,5,6,9,10-Hexabromocyclododecane.				
Data Type	Exposure; All; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3970257				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability	Metric 1: Methodology	Unacceptable	4	Unknown	
Domain 2: Representative	Metric 2: Geographic Scope	Acceptable	3	US	
	Metric 3: Applicability	Acceptable	3	Captures all possible stages, some of which are not in scope	
	Metric 4: Temporal Representativeness	Acceptable	3	2016	
	Metric 5: Sample Size	Unacceptable	4	Unknown	
Domain 3: Accessibility/Clarity	Metric 6: Metadata Completeness	Unacceptable	4	Unknown	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Unacceptable	4	No discussion	
Overall Quality Determination *		Unacceptable	4.0		
Extracted		Yes			
Parameter		EXTRACTION Data			
Worker Activity:		worker esitmate across entire lifecycle			
Number of Workers:		100 to 999			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2008. Risk assessment: hexabromocyclododecane.				
Data Type	Exposure; Manufacture; Manufacture; Completed Exposure or Risk Assessments;				
Hero ID	3970747				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Manufacture is not in scope but filling of bags can be applied to Import	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Unacceptable	4	Distribution of samples is characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination *		High	1.6		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Physical Form:		dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		0.0094 mg/m3			
Number of Sites:		1			
Type of Measurement or Method:		short-term, 88 mins			
Worker Activity:		filling of 25 kg or 1 ton bags			
Type of Sampling:		area			
Exposure Duration:		88 mins			
Bulk and Dust Particle Size Distribution:		20-150 ?m			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2008. Risk assessment: hexabromocyclododecane.				
Data Type	Exposure; Manufacture; Manufacture; Completed Exposure or Risk Assessments;				
Hero ID	3970747				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Manufacture is not in scope but filling of bags can be applied to Import	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Acceptable	3	characterized by a range uncertain statistics	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination *		High	1.4		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Physical Form:		dust			
Route of Exposure:		Dermal			
Exposure Concentration (Unit):		1 to 5 mg/cm2/day			
Type of Measurement or Method:		Modelled by EASE			
Worker Activity:		filling of 25 kg or 1 ton bags			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2008. Risk assessment: hexabromocyclododecane.				
Data Type	Exposure; Processing; XPS masterbatch; Completed Exposure or Risk Assessments;				
Hero ID	3970747				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	In scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2005	
Metric 5:	Sample Size	Acceptable	3	Fully characterized	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, as- sessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination *		High	1.3		
Extracted		Yes			
Parameter		EXTRACTION Data			
Physical Form:		granule			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		0.88 (mean), 1.36 (90th) mg/m3			
Number of Samples:		10			
Type of Measurement or Method:		8-hr TWA			
Worker Activity:		mixing and weighing			
Type of Sampling:		personal			
Exposure Duration:		19-295 min			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2008. Risk assessment: hexabromocyclododecane.				
Data Type	Exposure; Processing; XPS masterbatch; Completed Exposure or Risk Assessments;				
Hero ID	3970747				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	In scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2005	
Metric 5:	Sample Size	Acceptable	3	unknown if TWA, only know 90th percentile	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination *		High	1.4		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Physical Form:		granule			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		0.16 mg/m3 (90th)			
Number of Samples:		4			
Type of Measurement or Method:		unknown			
Worker Activity:		extruder operator			
Type of Sampling:		personal			
Exposure Duration:		5 hours			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2008. Risk assessment: hexabromocyclododecane.				
Data Type	Exposure; Processing; XPS masterbatch; Completed Exposure or Risk Assessments;				
Hero ID	3970747				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	In scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2001	
Metric 5:	Sample Size	Acceptable	3	unknown if TWA, unknown worker activities	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.4		
Extracted		Yes			
Parameter		EXTRACTION Data			
Physical Form:		powder			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		ND to 1.6 mg/m3			
Number of Samples:		16			
Number of Sites:		2			
Type of Measurement or Method:		unknown			
Worker Activity:		unknown			
Type of Sampling:		area			
Exposure Duration:		40-480 min			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa., 2008. Risk assessment: hexabromocyclododecane.				
Data Type	Exposure; Processing; XPS masterbatch; Completed Exposure or Risk Assessments;				
Hero ID	3970747				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	In scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2001	
Metric 5:	Sample Size	Acceptable	3	unknown if TWA, unknown worker activities	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.4		
Extracted		Yes			
Parameter		EXTRACTION Data			
Physical Form:		granule			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		ND to 0.88 mg/m3			
Number of Samples:		32			
Number of Sites:		6			
Type of Measurement or Method:		unknown			
Worker Activity:		unknown			
Type of Sampling:		area and personal			
Exposure Duration:		40-1435 min			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2008. Risk assessment: hexabromocyclododecane.				
Data Type	Exposure; Processing; cutting of XPS boards; Completed Exposure or Risk Assessments;				
Hero ID	3970747				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	In scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2005	
Metric 5:	Sample Size	Acceptable	3	unknown if TWA, unknown worker activities	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, as- sessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination *		High	1.4		
Extracted		Yes			
Parameter		EXTRACTION Data			
Physical Form:		solid			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		0.22 mg/m3 (90th)			
Number of Samples:		42			
Number of Sites:		3			
Type of Measurement or Method:		unknown			
Worker Activity:		unknown			
Type of Sampling:		area?			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2008. Risk assessment: hexabromocyclododecane.				
Data Type	Exposure; Processing; XPS masterbatch; Completed Exposure or Risk Assessments;				
Hero ID	3970747				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Norway	
Metric 3:	Applicability	Acceptable	3	In scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2007	
Metric 5:	Sample Size	Acceptable	3	unknown if TWA, unknown worker activities	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.4		
Extracted		Yes			
Parameter		EXTRACTION Data			
Physical Form:		powder			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		mean 0.5 ?g/m3, median 0.5 ?g/m3)			
Number of Samples:		30			
Type of Measurement or Method:		unknown			
Worker Activity:		mixer operator			
Type of Sampling:		personal			
Exposure Duration:		8-hr			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,, 2008. Risk assessment: hexabromocyclododecane.				
Data Type	Exposure; Processing; XPS masterbatch; Completed Exposure or Risk Assessments;				
Hero ID	3970747				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability	Metric 1: Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative	Metric 2: Geographic Scope	Acceptable	3	Norway	
	Metric 3: Applicability	Acceptable	3	In scope	
	Metric 4: Temporal Representativeness	Acceptable	3	2007	
	Metric 5: Sample Size	Acceptable	3	unknown if TWA, unknown worker activities	
Domain 3: Accessibility/Clarity	Metric 6: Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.4		
Extracted		Yes			
Parameter		EXTRACTION Data			
Physical Form:		powder			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		mean 15 ?g/m3, median 2.7 ?g/m3			
Number of Samples:		30			
Type of Measurement or Method:		unknown			
Worker Activity:		reactor operator			
Type of Sampling:		personal			
Exposure Duration:		8-hr			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2008. Risk assessment: hexabromocyclododecane.				
Data Type	Exposure; Processing; EPS Resin production; Completed Exposure or Risk Assessments;				
Hero ID	3970747				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Manufacturing EPS is not in scope, but some information may be applicable to other scenarios that are in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2005	
Metric 5:	Sample Size	Acceptable	3	Fully characterized	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination *		High	1.6		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Physical Form:		powder			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		Mean: 1.290 percent -ile: 1.1 mg/m3			
Type of Measurement or Method:		8-hr TWA			
Worker Activity:		adding to vessel			
Type of Sampling:		personal			
PPE:		Most workers were reported to use gloves, overall, eye protection, and disposable respirator.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2008. Risk assessment: hexabromocyclododecane.				
Data Type	Exposure; Processing; EPS Resin production; Completed Exposure or Risk Assessments;				
Hero ID	3970747				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Manufacturing EPS is not in scope, but some information may be applicable to other scenarios that are in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2005	
Metric 5:	Sample Size	Acceptable	3	Fully characterized	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination *		High	1.6		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Physical Form:		powder			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		Mean: 7.290 percent -ile: 10.6 mg/m3			
Type of Measurement or Method:		8-hr TWA			
Worker Activity:		Weighing HBCD powder before addition			
Type of Sampling:		personal			
PPE:		Most workers were reported to use gloves, overall, eye protection, and disposable respirator.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2008. Risk assessment: hexabromocyclododecane.				
Data Type	Exposure; Processing; XPS compounding; Completed Exposure or Risk Assessments;				
Hero ID	3970747				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	In scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Acceptable	3	characterized by a range uncertain statistics	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.2		
Extracted		Yes			
Parameter		EXTRACTION			
		Data			
Physical Form:		powder			
Route of Exposure:		Dermal			
Exposure Concentration (Unit):		0-0.1 mg/cm2/day			
Type of Measurement or Method:		Modelled by EASE			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	U.S. E. P. A.. 2015. TSCA Work Plan chemical problem formulation and initial assessment. Cyclic aliphatic bromide cluster flame retardants.				
Data Type	Exposure; All; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3809277				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	US	
Metric 3:	Applicability	Acceptable	3	Captures releases from all possible stages, some of which are not in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2012	
Metric 5:	Sample Size	Acceptable	3	characterized by a range with uncertain statistics	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination *		High	1.3		
Extracted		Yes			
EXTRACTION					
Data					
Number of Workers:		<2100			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	U.S, E. P. A.. 2015. TSCA Work Plan chemical problem formulation and initial assessment. Cyclic aliphatic bromide cluster flame retardants.				
Data Type	Exposure; Manufacture or Processing; Manufacture, Processing EPS or XPS; Monitoring Data;				
Hero ID	3809277				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Unacceptable	4	Sampling or analytical methodology is not specified.	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	EPS compounding and MFG not in scope, but other scenarios are	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Acceptable	3	characterized by a range with uncertain statistics	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Monitoring data include most critical metadata, such as sample type and exposure type, but lacks additional metadata, such as sample durations, exposure durations, exposure frequency	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		Medium	1.8		
Extracted		Yes			
Parameter		EXTRACTION Data			
Physical Form:		dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		0.1 to 2.5 mg/m3			
Type of Measurement or Method:		taken from 2008 EU assessment (HERO 3970747)			
Worker Activity:		handling standard grade HBCD powder at sites for the manufacture or processing			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	U.S, E. P. A.. 2015. TSCA Work Plan chemical problem formulation and initial assessment. Cyclic aliphatic bromide cluster flame retardants.				
Data Type	Exposure; Manufacture or Processing; Manufacture, Processing EPS or XPS; Monitoring Data;				
Hero ID	3809277				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Unacceptable	4	Sampling or analytical methodology is not specified.	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	EPS compounding and MFG not in scope, but other scenarios are	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Acceptable	3	characterized by a range with uncertain statistics	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Monitoring data include most critical metadata, such as sample type and exposure type, but lacks additional metadata, such as sample durations, exposure durations, exposure frequency	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		Medium	1.8		
Extracted		Yes			
Parameter		EXTRACTION Data			
Physical Form:		solid			
Route of Exposure:		Dermal			
Exposure Concentration (Unit):		84 to 840 mg/day			
Type of Measurement or Method:		taken from 2008 EU assessment (HERO 3970747)			
Worker Activity:		handling standard grade HBCD powder at sites for the manufacture or processing			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	. 2008. Summary risk assessment report: Hexabromocyclododecane.				
Data Type	Exposure; Manufacture; Manufacture; Completed Exposure or Risk Assessments;				
Hero ID	3970756				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Manufacture is not in scope but filling of bags can be applied to Import	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Acceptable	3	characterized by a range with uncertain statistics	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination*		High	1.6		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Physical Form:		Fine powder (via micronisation)			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		Worst case = 10 mg/m3; typical = 5 mg/m3			
Type of Measurement or Method:		from monitoring data or modelled			
Worker Activity:		Filling of bags at the production of HBCDD			
Bulk and Dust Particle Size Distribution:		micronised typically 3 to 4 ?m, powder typically 50 to 250 ?m; granulates typically > 500 ?m			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	. 2008. Summary risk assessment report: Hexabromocyclododecane.				
Data Type	Exposure; Manufacture; Manufacture; Completed Exposure or Risk Assessments;				
Hero ID	3970756				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Manufacture is not in scope but filling of bags can be applied to Import	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Acceptable	3	characterized by a range with uncertain statistics	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination*		High	1.6		
Extracted		Yes			
Parameter		EXTRACTION Data			
Physical Form:		Fine powder (via micronisation)			
Route of Exposure:		Dermal			
Exposure Concentration (Unit):		4200 mg/day			
Type of Measurement or Method:		from monitoring data or modelled			
Worker Activity:		Filling of bags at the production of HBCDD			
Bulk and Dust Particle Size Distribution:		micronised typically 3 to 4 ?m, powder typically 50 to 250 ?m; granulates typically > 500 ?m			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	. 2008. Summary risk assessment report: Hexabromocyclododecane.				
Data Type	Exposure; Manufacture; Manufacture; Completed Exposure or Risk Assessments;				
Hero ID	3970756				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Manufacture is not in scope but filling of bags can be applied to Import	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Acceptable	3	characterized by a range with uncertain statistics	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination*		High	1.6		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Physical Form:		powder			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		Worst case = 1.9 mg/m3; typical = 0.95 mg/m3			
Type of Measurement or Method:		from monitoring data or modelled			
Worker Activity:		Filling of bags at the production of HBCDD			
Bulk and Dust Particle Size Distribution:		micronised typically 3 to 4 ?m, powder typically 50 to 250 ?m; granulates typically > 500 ?m			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7; Medium = ≥ 1.7 to < 2.4; Low = ≥ 2.4 to < 3.

Study Citation:	. 2008. Summary risk assessment report: Hexabromocyclododecane.				
Data Type	Exposure; Manufacture; Manufacture; Completed Exposure or Risk Assessments;				
Hero ID	3970756				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Manufacture is not in scope but filling of bags can be applied to Import	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Acceptable	3	characterized by a range with uncertain statistics	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination*		High	1.6		
Extracted		Yes			
Parameter		EXTRACTION Data			
Physical Form:		granule			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		Worst case = 0.19 mg/m3; typical = 0.1 mg/m3			
Type of Measurement or Method:		from monitoring data or modelled			
Worker Activity:		Filling of bags at the production of HBCDD			
Bulk and Dust Particle Size Distribution:		micronised typically 3 to 4 ?m, powder typically 50 to 250 ?m; granulates typically > 500 ?m			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	. 2008. Summary risk assessment report: Hexabromocyclododecane.				
Data Type	Exposure; Manufacture; Manufacture; Completed Exposure or Risk Assessments;				
Hero ID	3970756				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Manufacture is not in scope but filling of bags can be applied to Import	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Acceptable	3	characterized by a range with uncertain statistics	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination*		High	1.6		
Extracted		Yes			
Parameter		EXTRACTION Data			
Physical Form:		powder			
Route of Exposure:		Dermal			
Exposure Concentration (Unit):		840 mg/day			
Type of Measurement or Method:		from monitoring data or modelled			
Worker Activity:		Filling of bags at the production of HBCDD			
Bulk and Dust Particle Size Distribution:		micronised typically 3 to 4 ?m, powder typically 50 to 250 ?m; granulates typically > 500 ?m			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	. 2008. Summary risk assessment report: Hexabromocyclododecane.				
Data Type	Exposure; Manufacture; Manufacture; Completed Exposure or Risk Assessments;				
Hero ID	3970756				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Manufacture is not in scope but filling of bags can be applied to Import	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Acceptable	3	characterized by a range with uncertain statistics	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination*		High	1.6		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Physical Form:		granule			
Route of Exposure:		Dermal			
Exposure Concentration (Unit):		84 mg/day			
Type of Measurement or Method:		from monitoring data or modelled			
Worker Activity:		Filling of bags at the production of HBCDD			
Bulk and Dust Particle Size Distribution:		micronised typically 3 to 4 ?m, powder typically 50 to 250 ?m; granulates typically > 500 ?m			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	. 2008. Summary risk assessment report: Hexabromocyclododecane.				
Data Type	Exposure; Processing; Formulation of XPS; Completed Exposure or Risk Assessments;				
Hero ID	3970756				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	In scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Acceptable	3	characterized by a range with uncertain statistics	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination*		High	1.3		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Physical Form:		Fine powder (via micronisation)			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		Worst case = 3.1 mg/m3; typical = 1.55 mg/m3			
Type of Measurement or Method:		from monitoring data or modelled			
Worker Activity:		Adding HBCD to process			
Bulk and Dust Particle Size Distribution:		micronised typically 3 to 4 ?m, powder typically 50 to 250 ?m; granulates typically > 500 ?m			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation: . 2008. Summary risk assessment report: Hexabromocyclododecane.					
Data Type Exposure; Processing; Formulation of XPS; Completed Exposure or Risk Assessments;					
Hero ID 3970756					
Domain		Metric	Rating	Score	Comments
Domain 1: Reliability					
Metric 1:	Methodology		Acceptable	3	Information is from trusted sources
Domain 2: Representative					
Metric 2:	Geographic Scope		Acceptable	3	Europe
Metric 3:	Applicability		Acceptable	3	In scope
Metric 4:	Temporal Representativeness		Acceptable	3	2008
Metric 5:	Sample Size		Acceptable	3	characterized by a range with uncertain statistics
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness		Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness		Acceptable	3	limited discussion
Overall Quality Determination *			High	1.3	
Extracted			Yes		
Parameter			EXTRACTION Data		
Physical Form:			Fine powder (via micronisation)		
Route of Exposure:			Dermal		
Exposure Concentration (Unit):			120 mg/day		
Type of Measurement or Method:			from monitoring data or modelled		
Worker Activity:			Adding HBCD to process		
Bulk and Dust Particle Size Distribution:			micronised typically 3 to 4 ?m, powder typically 50 to 250 ?m; granulates typically > 500 ?m		

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	. 2008. Summary risk assessment report: Hexabromocyclododecane.				
Data Type	Exposure; Processing; Formulation of XPS; Completed Exposure or Risk Assessments;				
Hero ID	3970756				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	In scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Acceptable	3	characterized by a range with uncertain statistics	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination*		High	1.3		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Physical Form:		powder			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		Worst case = 2.5 mg/m3; typical = 1.25 mg/m3			
Type of Measurement or Method:		from monitoring data or modelled			
Worker Activity:		Adding HBCD to process			
Bulk and Dust Particle Size Distribution:		micronised typically 3 to 4 ?m, powder typically 50 to 250 ?m; granulates typically > 500 ?m			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	. 2008. Summary risk assessment report: Hexabromocyclododecane.				
Data Type	Exposure; Processing; Formulation of XPS; Completed Exposure or Risk Assessments;				
Hero ID	3970756				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	In scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Acceptable	3	characterized by a range with uncertain statistics	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination*		High	1.3		
Extracted		Yes			
Parameter		EXTRACTION Data			
Physical Form:		granule			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		Worst case = 0.22 mg/m3; typical = 0.11 mg/m3			
Type of Measurement or Method:		from monitoring data or modelled			
Worker Activity:		Adding HBCD to process			
Bulk and Dust Particle Size Distribution:		micronised typically 3 to 4 ?m, powder typically 50 to 250 ?m; granulates typically > 500 ?m			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7; Medium = ≥ 1.7 to < 2.4; Low = ≥ 2.4 to < 3.

Study Citation: . 2008. Summary risk assessment report: Hexabromocyclododecane.					
Data Type Exposure; Processing; Formulation of XPS; Completed Exposure or Risk Assessments;					
Hero ID 3970756					
Domain		Metric	Rating	Score	Comments
Domain 1: Reliability					
Metric 1:	Methodology		Acceptable	3	Information is from trusted sources
Domain 2: Representative					
Metric 2:	Geographic Scope		Acceptable	3	Europe
Metric 3:	Applicability		Acceptable	3	In scope
Metric 4:	Temporal Representativeness		Acceptable	3	2008
Metric 5:	Sample Size		Acceptable	3	characterized by a range with uncertain statistics
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness		Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness		Acceptable	3	limited discussion
Overall Quality Determination *			High	1.3	
Extracted			Yes		
Parameter			EXTRACTION Data		
Physical Form:			powder		
Route of Exposure:			Dermal		
Exposure Concentration (Unit):			84 mg/day		
Type of Measurement or Method:			from monitoring data or modelled		
Worker Activity:			Adding HBCD to process		
Bulk and Dust Particle Size Distribution:			micronised typically 3 to 4 ?m, powder typically 50 to 250 ?m; granulates typically > 500 ?m		

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	. 2008. Summary risk assessment report: Hexabromocyclododecane.				
Data Type	Exposure; Processing; Formulation of XPS; Completed Exposure or Risk Assessments;				
Hero ID	3970756				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	In scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Acceptable	3	characterized by a range with uncertain statistics	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, as- essment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination *		High	1.3		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Physical Form:		granule			
Route of Exposure:		Dermal			
Exposure Concentration (Unit):		8.4 mg/day			
Type of Measurement or Method:		from monitoring data or modelled			
Worker Activity:		Adding HBCD to process			
Bulk and Dust Particle Size Distribution:		micronised typically 3 to 4 ?m, powder typically 50 to 250 ?m; granulates typically > 500 ?m			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2009. Prioritisation and Annex XIV background information: hexbromocyclododecane.				
Data Type	Exposure; Manufacture; Manufacture; Monitoring Data;				
Hero ID	3970759				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Unacceptable	4	Sampling or analytical methodology is not specified.	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Manufacture is not in scope but filling of bags can be applied to Import	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Acceptable	3	characterized by a range with uncertain statistics	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Monitoring data do not include any needed metadata to understand what the data represent and are not usable in the risk evaluation	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination*		Unacceptable	4.0		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Physical Form:		powder			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		0.18 mg/m3 of HBCD in dust (respirable); 1.23 mg/m3 HBCD in dust (total)			
Type of Measurement or Method:		measured			
Worker Activity:		Packaging of powders			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2009. Prioritisation and Annex XIV background information: hexbromocyclododecane.				
Data Type	Exposure; Manufacture; Manufacture; Monitoring Data;				
Hero ID	3970759				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	approved modelling approach	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Manufacture is not in scope but filling of bags can be applied to Import	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Acceptable	3	characterized by a range with uncertain statistics	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Enough metadata to be used	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination*		Medium	1.8		
Extracted		Yes			
Parameter		EXTRACTION Data			
Physical Form:		powder			
Route of Exposure:		Dermal			
Exposure Concentration (Unit):		170 mg/day			
Type of Measurement or Method:		modelled with EASE			
Worker Activity:		Packaging of powders			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2009. Prioritisation and Annex XIV background information: hexbromocyclododecane.				
Data Type	Exposure; Manufacture; Manufacture; Monitoring Data;				
Hero ID	3970759				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	approved modelling approach	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Manufacture is not in scope but filling of bags can be applied to Import	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Acceptable	3	characterized by a range with uncertain statistics	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Enough metadata to be used	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination*		Medium	1.8		
Extracted		Yes			
Parameter		EXTRACTION			
		Data			
Physical Form:		granule			
Route of Exposure:		Dermal			
Exposure Concentration (Unit):		17 mg/day			
Type of Measurement or Method:		modelled with EASE			
Worker Activity:		Packaging of powders			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2009. Prioritisation and Annex XIV background information: hexbromocyclododecane.				
Data Type	Exposure; Processing; XPS formulation; Monitoring Data;				
Hero ID	3970759				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Unacceptable	4	Sampling or analytical methodology is not specified.	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	In scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Acceptable	3	characterized by a range with uncertain statistics	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Monitoring data do not include any needed metadata to understand what the data represent and are not usable in the risk evaluation	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination*		Unacceptable	4.0		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Physical Form:		Dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		mean 0.01 mg/m3 (respirable), 0.03 mg/m3 (total)			
Type of Measurement or Method:		measured			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2009. Prioritisation and Annex XIV background information: hexbromocyclododecane.				
Data Type	Exposure; Processing; EPS, HIPS, production of textile coating; Monitoring Data;				
Hero ID	3970759				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Unacceptable	4	Sampling or analytical methodology is not specified.	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	These compounding processes are not in scope but may provide baseline for other scenarios	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Acceptable	3	characterized by a range with uncertain statistics	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Monitoring data do not include any needed metadata to understand what the data represent and are not usable in the risk evaluation	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination *		Unacceptable	4.0		
Extracted		Yes			
Parameter		EXTRACTION Data			
Physical Form:		Dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		mean total dust 1.18 to 1.89 mg/m3			
Type of Measurement or Method:		measured			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2009. Prioritisation and Annex XIV background information: hexbromocyclododecane.				
Data Type	Exposure; Processing; HBCDD use for XPS, EPS and HIPS; Monitoring Data;				
Hero ID	3970759				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	approved modelling approach	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	XPS in scope but others are not	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Acceptable	3	characterized by a range with uncertain statistics	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Enough metadata to be used	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination*		Medium	1.8		
Extracted		Yes			
Parameter		EXTRACTION Data			
Physical Form:		Solid			
Route of Exposure:		Dermal			
Exposure Concentration (Unit):		17 mg/day			
Type of Measurement or Method:		modelled			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Ni, H. G.,Zeng, H.. 2013. HBCD and TBBPA in particulate phase of indoor air in Shenzhen, China. Science of the Total Environment.				
Data Type	Exposure; Commerical Use; Insulation products in offices; Monitoring Data;				
Hero ID	1927552				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Describes how the data was modeled from the HBCD dust concentrations	
Domain 2: Representative					
Metric 2:	Geographic Scope	Unacceptable	4	China (non-OECD country)	
Metric 3:	Applicability	Unacceptable	4	The data are for a non-occupational scenario (consumer exposure) that is similar to an occupational scenario (service life) within the scope of the risk evaluation	
Metric 4:	Temporal Representativeness	Acceptable	3	2013	
Metric 5:	Sample Size	Acceptable	3	Indicates number of locations and provides several statistics of the sample size.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Monitoring data include all associated metadata.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		Medium	2.0		
Extracted		Yes			
Parameter		EXTRACTION Data			
Physical Form:		dust captured on indoor air filters			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		27.3 - 2,274 pg/m3 (mean - 1,001 pg/m3)			
Number of Samples:		56 (1 per site)			
Number of Sites:		56			
Type of Measurement or Method:		TWA			
Worker Activity:		Modeled data based on HBCD concentration in dust. No associated worker activity.			
Continued on next page					

– continued from previous page

Study Citation:	Ni, H. G., Zeng, H.. 2013. HBCD and TBBPA in particulate phase of indoor air in Shenzhen, China. Science of the Total Environment.			
Data Type	Exposure; Commercial Use; Insulation products in offices; Monitoring Data;			
Hero ID	1927552			
Domain	Metric	Rating	Score	Comments
Type of Sampling:	Central air conditioner filter dusts were collected as particulate phase of indoor air (PPIA)			
Sampling Location:	Offices			
Bulk and Dust Particle Size Distribution:	PM2.5 (Particle Size 0.4 - 2.2 μ m)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High = ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Ni, H. G.,Zeng, H.. 2013. HBCD and TBBPA in particulate phase of indoor air in Shenzhen, China. Science of the Total Environment.				
Data Type	Exposure; Commerical Use; Insulation products in offices; Monitoring Data;				
Hero ID	1927552				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Describes how the data was modeled from the HBCD dust concentrations	
Domain 2: Representative					
Metric 2:	Geographic Scope	Unacceptable	4	China (non-OECD country)	
Metric 3:	Applicability	Unacceptable	4	The data are for a non-occupational scenario (consumer exposure) that is similar to an occupational scenario (service life) within the scope of the risk evaluation	
Metric 4:	Temporal Representativeness	Acceptable	3	2013	
Metric 5:	Sample Size	Acceptable	3	Indicates number of locations and provides several statistics of the sample size.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Monitoring data include all associated metadata.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		Medium	2.0		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Physical Form:		dust captured on indoor air filters			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		13.5 - 1,099 pg/m3 (mean - 235 pg/m3)			
Number of Samples:		56 (1 per site)			
Number of Sites:		56			
Type of Measurement or Method:		TWA			
Worker Activity:		Modeled data based on HBCD concentration in dust			
Continued on next page					

– continued from previous page

Study Citation:	Ni, H. G., Zeng, H.. 2013. HBCD and TBBPA in particulate phase of indoor air in Shenzhen, China. Science of the Total Environment.			
Data Type	Exposure; Commerical Use; Insulation products in offices; Monitoring Data;			
Hero ID	1927552			
Domain	Metric	Rating	Score	Comments
Type of Sampling:	Cenral air conditioner filter dusts were collected as particulate phase of indoor air (PPIA)			
Sampling Location:	Offices			
Bulk and Dust Particle Size Distribution:	PM10 (Paricle Size 2.5 - 8.9 um)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Ni, H. G.,Zeng, H.. 2013. HBCD and TBBPA in particulate phase of indoor air in Shenzhen, China. Science of the Total Environment.				
Data Type	Exposure; Consumer Use; Insulation products in indoor public microenvironments; Monitoring Data;				
Hero ID	1927552				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Unacceptable	4	Does not specify releases since mostly measure dust concentration for exposure modeling	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	UK	
Metric 3:	Applicability	Unacceptable	4	The data are for a non-occupational scenario (consumer exposure) that is similar to an occupational scenario (service life) within the scope of the risk evaluation	
Metric 4:	Temporal Representativeness	Acceptable	3	Published in 2008 (10 years ago)	
Metric 5:	Sample Size	Acceptable	3	Indicates number of locations but does not specify number of samples at each location. However, provides several statistics of the sample size.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Release data include release media but no other metadata.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		Low	2.4		
Extracted		Yes			
Parameter		EXTRACTION Data			
Physical Form:		settled dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		90 ng/g - 140,000 ng/g (mean - 8,300 ng/g)			
Number of Sites:		97			
Type of Measurement or Method:		Concentration in dust			
Worker Activity:		HBCDs found from several products used in indoor environments. No associated worker activity.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Allen, J. G.,Stapleton, H. M.,Vallarino, J.,McNeely, E.,McClellan, M. D.,Harrad, S. J.,Rauert, C. B.,Spengler, J. D.. 2013. Exposure to flame retardant chemicals on commercial airplanes. Environmental Health: A Global Access Science Source.				
Data Type	Exposure; Commerical Use; Insulation products in airplanes ; Monitoring Data;				
Hero ID	1597662				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Unacceptable	4	Does not specify releases, only dust concentrations	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	US	
Metric 3:	Applicability	Unacceptable	4	The data are for a non-occupational scenario (consumer exposure) that is similar to an occupational scenario (service life) within the scope of the risk evaluation	
Metric 4:	Temporal Representativeness	Acceptable	3	Samples were collected in 2010	
Metric 5:	Sample Size	Acceptable	3	Provides number of samples but little statistical bases	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Only includes amount in dust (essentially an HBCD concentration)	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		Medium	2.2		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Physical Form:		settled dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		180 - 1,100,000 ng/g HBCD in dust			
Number of Sites:		40			
Type of Measurement or Method:		Concentration in dust			
Worker Activity:		HBCD in dust collected on airplanes on floor and in vents. No associated worker activity.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Allen, J. G.,Stapleton, H. M.,Vallarino, J.,McNeely, E.,McClean, M. D.,Harrad, S. J.,Rauert, C. B.,Spengler, J. D.. 2013. Exposure to flame retardant chemicals on commercial airplanes. Environmental Health: A Global Access Science Source.				
Data Type	Exposure; Consumer Use; Insulation products in homes; Monitoring Data;				
Hero ID	1597662				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Unacceptable	4	Does not specify releases, only dust concentrations	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	US	
Metric 3:	Applicability	Unacceptable	4	The data are for a non-occupational scenario (consumer exposure) that is similar to an occupational scenario (service life) within the scope of the risk evaluation	
Metric 4:	Temporal Representativeness	Acceptable	3	Samples were collected in 2010	
Metric 5:	Sample Size	Acceptable	3	Provides number of samples but little statistical bases	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Only includes amount in dust (essentially an HBCD concentration)	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination *		Medium	2.2		
Extracted		Yes			
Parameter		EXTRACTION Data			
Physical Form:		settled dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		2 - 2,800 ng/g HBCD in dust			
Number of Sites:		13			
Type of Measurement or Method:		Concentration in dust			
Worker Activity:		HBCD in dust collected from homes. No associated worker activity.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High = ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Harrad, S.,Ibarra, C.,Abdallah, M. A. E.,Boon, R.,Neels, H.,Covaci, A.. 2008. Concentrations of brominated flame retardants in dust from United Kingdom cars, homes, and offices: causes of variability and implications for human exposure. Environment International.				
Data Type	Exposure; Commerical Use; Insulation products in offices; Monitoring Data;				
Hero ID	1005148				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Methodology is well described	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	UK	
Metric 3:	Applicability	Unacceptable	4	The data are for a non-occupational scenario (consumer exposure) that is similar to an occupational scenario (service life) within the scope of the risk evaluation	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Acceptable	3	Indicates number of locations and provides several statistics of the sample size.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Include necessary metadata	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.6		
Extracted		Yes			
Parameter		EXTRACTION Data			
Physical Form:		settled dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		31,000 ?PBDEs/g			
Type of Measurement or Method:		Concentration in dust			
Worker Activity:		Average concentrations of polybrominated diphenyl ethers (PBDEs) in dust in 18 offices. No associated worker activities.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Nicnas,. 2001. Polybrominated flame retardants (PBFRs): Priority existing chemical assessment report no. 20.				
Data Type	Exposure; Processing; Formulation of XPS and converting of XPS; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	1443962				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Acceptable	3	Information from trusted sources
Domain 2: Representative	Metric 2:	Geographic Scope	Acceptable	3	Australia
	Metric 3:	Applicability	Acceptable	3	In-scope
	Metric 4:	Temporal Representativeness	Acceptable	3	2001
	Metric 5:	Sample Size	N/A	N/A	This metric is not applicable to this data type
Domain 3: Accessibility/Clarity	Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.
Overall Quality Determination*		High	1.4		
Extracted		Yes			
EXTRACTION					
Parameter	Data				
Continued on next page					

– continued from previous page

Study Citation:	Nicnas,. 2001. Polybrominated flame retardants (PBFRs): Priority existing chemical assessment report no. 20.
Data Type	Exposure; Processing; Formulation of XPS and converting of XPS; Reports for Data or Information Other than Exposure or Release Data;
Hero ID	1443962

Domain	Metric	Rating	Score	Comments
Worker Activity:				Workers in the formulation industry, that is those involved in the formulation of flame retarded resins, have the greatest risk of exposure since they weigh, transfer and mix the solid powder or liquid resins containing pure/concentrated PBFRs. Downstream fabricators who handle the formulated resins, emulsions and/or polymers are also expected to be exposed to the PBFRs. Dermal contact is the main route of exposure resulting from contact with these solutions. Given that the PBFRs are non-volatile, exposure by inhalation is expected to be minimal when handling liquid resins. However, potential for exposure by inhalation of dust generated while handling powder compounds is high. Some release of volatile, thermal degradation products of some PBFRs may occur during moulding of polymer at processing temperatures.

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Allen, J. G.,Stapleton, H. M.,Vallarino, J.,McNeely, E.,McClean, M. D.,Harrad, S. J.,Rauert, C. B.,Spengler, J. D.. 2013. Exposure to flame retardant chemicals on commercial airplanes. Environmental Health: A Global Access Science Source.				
Data Type	Exposure; Consumer Use; Insulation products in homes; Monitoring Data;				
Hero ID	1597662				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Methodology is well described	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	US	
Metric 3:	Applicability	Unacceptable	4	Non-occupational scenario (settled dust in homes). No associated worker activities.	
Metric 4:	Temporal Representativeness	Acceptable	3	2017	
Metric 5:	Sample Size	Acceptable	3	Indicates number of locations and provides several statistics	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination *		Unacceptable	4.0		
Extracted		Yes			
Parameter		EXTRACTION Data			
Physical Form:		settled dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		6 - 2000 ng HBCD/g dust			
Type of Measurement or Method:		Concentration in dust			
Worker Activity:		Average concentrations of HBCD in homes. No associated worker activity.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Zhang, H.,Kuo, Y. Y.,Gerecke, A. C.,Wang, J.. 2012. Co-release of hexabromocyclododecane (HBCD) and Nano- and microparticles from thermal cutting of polystyrene foams. Environmental Science and Technology.				
Data Type	Exposure; Processing; XPS Thermal Cutting; Completed Exposure or Risk Assessments;				
Hero ID	1927576				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Switzerland	
Metric 3:	Applicability	Acceptable	3	in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2012	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		High	1.6		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Physical Form:		Dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		89.0 ug/m3			
Worker Activity:		Modeled personal area breathing zone based on closed glovebox sampling system			
Number of Workers:		1			
Type of Sampling:		personal			
Sampling Location:		Thermal cutting operation			
Exposure Duration:		1 hour			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Zhang, H.,Kuo, Y. Y.,Gerecke, A. C.,Wang, J.. 2012. Co-release of hexabromocyclododecane (HBCD) and Nano- and microparticles from thermal cutting of polystyrene foams. Environmental Science and Technology.				
Data Type	Exposure; Processing; EPS Thermal Cutting; Completed Exposure or Risk Assessments;				
Hero ID	1927576				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Switzerland	
Metric 3:	Applicability	Acceptable	3	in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2012	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		High	1.6		
Extracted		Yes			
Parameter		EXTRACTION Data			
Physical Form:	Dust				
Route of Exposure:	Inhalation				
Exposure Concentration (Unit):	57.3 ug/m3				
Worker Activity:	Modeled personal area breathing zone based on closed glovebox sampling system				
Number of Workers:	1				
Type of Sampling:	personal				
Sampling Location:	Thermal cutting operation				
Exposure Duration:	1 hour				

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Rosenberg, C.,Hämeilä, M.,Tornaeus, J.,Säkinen, K.,Puttonen, K.,Korpi, A.,Kiilunen, M.,Linnainmaa, M.,Hesso, A.. 2011 Exposure to flame retardants in electronics recycling sites. Annals of Occupational Hygiene.				
Data Type	Exposure; Disposal; Disposal of Waste of Electric and Electronic Equipment (WEEE); Monitoring Data;				
Hero ID	1927633				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Methodology is well described	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Finland	
Metric 3:	Applicability	Unacceptable	4	Out of scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2009	
Metric 5:	Sample Size	Acceptable	3	Indicates number of samples and provides several statistics	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, as- sessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination *		Unacceptable	4.0		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Physical Form:		Dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		8-50 ng HBCD/m3			
Number of Samples:		45			
Number of Sites:		4			
Worker Activity:		The workers were either sorters or dismantlers,or both, or process con- trollers.			
Number of Workers:		34			
Type of Sampling:		personal			
Exposure Duration:		191 to 408 min.			
Continued on next page					

– continued from previous page

Study Citation:	Rosenberg, C.,Hämeilä, M.,Tornaeus, J.,Säkinen, K.,Puttonen, K.,Korpi, A.,Kiilunen, M.,Linnainmaa, M.,Hesso, A.. 2011. Exposure to flame retardants in electronics recycling sites. Annals of Occupational Hygiene.			
Data Type	Exposure; Disposal; Disposal of Waste of Electric and Electronic Equipment (WEEE); Monitoring Data;			
Hero ID	1927633			
Domain	Metric	Rating	Score	Comments

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Saito, I.,Onuki, A.,Seto, H.. 2007. Indoor organophosphate and polybrominated flame retardants in Tokyo. Indoor Air.				
Data Type	Exposure; Consumer Use; Insulation products in homes; Monitoring Data;				
Hero ID	1927779				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Methodology is well described	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Japan	
Metric 3:	Applicability	Unacceptable	4	Non-occupational scenario (settled dust in homes). No associated worker activities.	
Metric 4:	Temporal Representativeness	Acceptable	3	2006	
Metric 5:	Sample Size	Acceptable	3	Indicates number of samples and provides several statistics	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination*		Unacceptable	4.0		
Extracted		Yes			
Parameter		EXTRACTION Data			
Physical Form:		settled dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		up to 24 ng/m3			
Number of Samples:		18			
Type of Measurement or Method:		Concentration in dust			
Worker Activity:		HBCD in dust collected from homes. No associated worker activity.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High = ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Saito, I.,Onuki, A.,Seto, H.. 2007. Indoor organophosphate and polybrominated flame retardants in Tokyo. Indoor Air.				
Data Type	Exposure; Commerical Use; Insulation products in offices; Monitoring Data;				
Hero ID	1927779				
Domain		Metric	Rating	Score	Comments
Domain 1: Reliability					
Metric 1:	Methodology		Acceptable	3	Methodology is well described
Domain 2: Representative					
Metric 2:	Geographic Scope		Acceptable	3	Japan
Metric 3:	Applicability		Unacceptable	4	Occupational scenario (use of insulation in offices). No associated worker activities.
Metric 4:	Temporal Representativeness		Acceptable	3	2006
Metric 5:	Sample Size		Acceptable	3	Indicates number of samples and provides several statistics
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness		Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness		Acceptable	3	limited discussion
Overall Quality Determination *			Unacceptable	4.0	
Extracted			Yes		
Parameter			EXTRACTION Data		
Physical Form:			settled dust		
Route of Exposure:			Inhalation		
Exposure Concentration (Unit):			up to 29.5 ng/m3		
Number of Samples:			14		
Type of Measurement or Method:			Concentration in dust		
Worker Activity:			HBCD in dust collected from offices. No associated worker activities.		

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High = ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Strid, A.,Smedje, G.,Athanasiasidis, I.,Lindgren, T.,Lundgren, H.,Jakobsson, K.,Bergman, A.. 2014. Brominated flame retardant exposure of aircraft personnel. Chemosphere.				
Data Type	Exposure; Commerical Use; Insulation products in airplanes ; Monitoring Data;				
Hero ID	2343686				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Methodology is well described	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Sweden	
Metric 3:	Applicability	Acceptable	3	Occupational scenario (use of insulation in aircraft). Will be assessed by Exposure Assessors (not Engineering Assessors)	
Metric 4:	Temporal Representativeness	Acceptable	3	2014	
Metric 5:	Sample Size	Acceptable	3	Indicates number of samples and provides several statistics	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.1		
Extracted		Yes			
Parameter		EXTRACTION			
		Data			
Physical Form:		dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		<LOD to 1500 pmol/m3			
Number of Samples:		6			
Type of Measurement or Method:		Concentration in dust			
Worker Activity:		sampled during maintenancework			
Type of Sampling:		personal			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Strid, A.,Smedje, G.,Athanassiadis, I.,Lindgren, T.,Lundgren, H.,Jakobsson, K.,Bergman, A.. 2014. Brominated flame retardant exposure of aircraft personnel. Chemosphere.				
Data Type	Exposure; Commerical Use; Insulation products in airplanes ; Monitoring Data;				
Hero ID	2343686				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Methodology is well described	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Sweden	
Metric 3:	Applicability	Acceptable	3	Occupational scenario (use of insulation in aircraft). Will be assessed by Exposure Assessors (not Engineering Assessors)	
Metric 4:	Temporal Representativeness	Acceptable	3	2014	
Metric 5:	Sample Size	Acceptable	3	Indicates number of samples and provides several statistics	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.1		
Extracted		Yes			
Parameter		EXTRACTION Data			
Physical Form:		dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		0.49 to 490 pmol/m3			
Number of Samples:		9			
Type of Measurement or Method:		Concentration in dust			
Worker Activity:		sampled during maintenancework - locations in Table 1			
Type of Sampling:		area			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Strid, A.,Smedje, G.,Athanasiasidis, I.,Lindgren, T.,Lundgren, H.,Jakobsson, K.,Bergman, A.. 2014. Brominated flame retardant exposure of aircraft personnel. Chemosphere.				
Data Type	Exposure; Consumer Use; Insulation products in homes; Monitoring Data;				
Hero ID	2343686				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Methodology is well described	
Domain 2: Representative					
Metric 2:	Geographic Scope	Unacceptable	4	Egypt	
Metric 3:	Applicability	Unacceptable	4	Non-occupational scenario (settled dust in homes). No associated worker activites.	
Metric 4:	Temporal Representativeness	Acceptable	3	2015	
Metric 5:	Sample Size	Acceptable	3	Indicates number of samples and provides several statistics	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination *		Unacceptable	4.0		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Physical Form:		settled dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		median = 6 ng HBCD/g dust			
Worker Activity:		HBCD in dust collected from homes. No associated worker activity.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	Strid, A.,Smedje, G.,Athanassiadis, I.,Lindgren, T.,Lundgren, H.,Jakobsson, K.,Bergman, A.. 2014. Brominated flame retardant exposure of aircraft personnel. Chemosphere.				
Data Type	Exposure; Commerical Use; Insulation products in offices; Monitoring Data;				
Hero ID	2343686				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Methodology is well described	
Domain 2: Representative					
Metric 2:	Geographic Scope	Unacceptable	4	Egypt	
Metric 3:	Applicability	Unacceptable	4	Occupational scenario (use of insulation in offices). No associated worker activities.	
Metric 4:	Temporal Representativeness	Acceptable	3	2015	
Metric 5:	Sample Size	Acceptable	3	Indicates number of samples and provides several statistics	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination *		Unacceptable	4.0		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Physical Form:		settled dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		median = 19 ng HBCD/g dust			
Worker Activity:		HBCD in dust collected from offices. No associated worker activities.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	Strid, A.,Smedje, G.,Athanasias, I.,Lindgren, T.,Lundgren, H.,Jakobsson, K.,Bergman, A.. 2014. Brominated flame retardant exposure of aircraft personnel. Chemosphere.				
Data Type	Exposure; Consumer Use; Insulation products in cars; Monitoring Data;				
Hero ID	2343686				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Methodology is well described	
Domain 2: Representative					
Metric 2:	Geographic Scope	Unacceptable	4	Egypt	
Metric 3:	Applicability	Unacceptable	4	Non-occupational scenario (settled dust in cars). No associated worker activities.	
Metric 4:	Temporal Representativeness	Acceptable	3	2015	
Metric 5:	Sample Size	Acceptable	3	Indicates number of samples and provides several statistics	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination *		Unacceptable	4.0		
Extracted		Yes			
Parameter		EXTRACTION Data			
Physical Form:		settled dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		median = 37 ng HBCD/g dust			
Worker Activity:		HBCD in dust collected from cars. No associated worker activities.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	Zeng, Y. H.,Tang, B.,Luo, X. J.,Zheng, X. B.,Peng, P. A.,Mai, B. X.. 2016. Organohalogen pollutants in surface particulates from workshop floors of four major e-waste recycling sites in China and implications for emission lists. Science of the Total Environment.				
Data Type	Exposure; Disposal; Disposal of Waste of Electric and Electronic Equipment (WEEE); Monitoring Data;				
Hero ID	3350480				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Methodology is well described	
Domain 2: Representative					
Metric 2:	Geographic Scope	Unacceptable	4	China (non-OECD country)	
Metric 3:	Applicability	Unacceptable	4	Out of scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2016	
Metric 5:	Sample Size	Acceptable	3	Indicates number of samples and provides several statistics	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		Unacceptable	4.0		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Physical Form:		Dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		555700 ng/g dust			
Number of Sites:		4			
Worker Activity:		HBCD in dust collected from floors of e-waste facilities			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Velsicol Chem, Corp. 1978. Industrial hygiene survey, Velsicol Chemical Corporation, El Dorado, Ark Plant, Fire Master 680 Unit and semi-works summary with attachments and cover letter dated 071978.				
Data Type	Exposure; Manufacturing; HBCD manufacture; Monitoring Data;				
Hero ID	1928232				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	data or techniques that are high quality	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	US	
Metric 3:	Applicability	Acceptable	3	Manufacturing is out of scope, but this information may be applicable to import	
Metric 4:	Temporal Representativeness	Unacceptable	4	1978	
Metric 5:	Sample Size	Unacceptable	4	Sample statistics not discussed, however, since this is an IH survey it can be assumed that this was considered.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		Medium	2.1		
Extracted		Yes			
Parameter		EXTRACTION Data			
Physical Form:		Dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		1.9 mg/m3			
Number of Sites:		1			
Type of Measurement or Method:		Industrial hygiene survey sample			
Worker Activity:		Transfer of the HBCD in the hammer-mill to 28 drums			
Number of Workers:		1			
Exposure Duration:		300 minutes (5 hours)			
PPE:		Respiratory protection but no other dermal and eye protection (such as goggles or gloves) were worn			
Continued on next page					

– continued from previous page

Study Citation:	Velsicol Chem, Corp. 1978. Industrial hygiene survey, Velsicol Chemical Corporation, El Dorado, Ark Plant, Fire Master 680 Unit and semi-works summary with attachments and cover letter dated 07/1978.			
Data Type	Exposure; Manufacturing; HBCD manufacture; Monitoring Data;			
Hero ID	1928232			
Domain	Metric	Rating	Score	Comments

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Yi, S.,Liu, J. G.,Jin, J.,Zhu, J.. 2016. Assessment of the occupational and environmental risks of hexabromocyclododecane (HBCD) in China. Chemosphere.				
Data Type	Exposure; Manufacture; HBCD Production; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3350493				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Unacceptable	4	China	
Metric 3:	Applicability	Acceptable	3	Manufacturing is out of scope, but this information may be applicable to import	
Metric 4:	Temporal Representativeness	Acceptable	3	2016	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		Medium	2.1		
Extracted		Yes			
Parameter		EXTRACTION Data			
Physical Form:		Dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		10.2 ug/m3 to 28.3 ug/m3			
Number of Sites:		14			
Number of Workers:		23 to 37			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Yi, S.,Liu, J. G.,Jin, J.,Zhu, J.. 2016. Assessment of the occupational and environmental risks of hexabromocyclododecane (HBCD) in China. Chemosphere.				
Data Type	Exposure; Processing; XPS formulation; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3350493				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Unacceptable	4	China	
Metric 3:	Applicability	Acceptable	3	in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2016	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		Medium	1.9		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Physical Form:		Dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		3.62 ug/m3 to 35.5 ug/m3			
Number of Sites:		520			
Number of Workers:		520 to 1,040			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Yi, S.,Liu, J. G.,Jin, J.,Zhu, J.. 2016. Assessment of the occupational and environmental risks of hexabromocyclododecane (HBCD) in China. Chemosphere.				
Data Type	Exposure; Processing; EPS formulation; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3350493				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Unacceptable	4	China	
Metric 3:	Applicability	Acceptable	3	Manufacturing EPS is not in scope, but some information may be applicable to other scenarios that are in scope or may be used as surrogate data	
Metric 4:	Temporal Representativeness	Acceptable	3	2016	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		Medium	2.1		
Extracted		Yes			
Parameter		EXTRACTION Data			
Physical Form:		Dust			
Route of Exposure:		Inhalation			
Exposure Concentration (Unit):		16 ug/m3 to 26.7 ug/m3			
Number of Sites:		65			
Number of Workers:		71 to 136			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	ToxNet Hazardous Substances Data, Bank. 2017. HSDB: 1,2,5,6,9,10-Hexabromocyclododecane.				
Data Type	Exposure; All; HBCD; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3970278				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	US	
Metric 3:	Applicability	Unacceptable	4	Toxicity information is relevant to the Risk Assessment, but is not utilized by the engineering assessors	
Metric 4:	Temporal Representativeness	Acceptable	3	2017	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		Unacceptable	4.0		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Worker Activity:		Provides toxicity data on HBCD. No information extracted.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2017. Hexabromocyclododecane, Part 2.				
Data Type	Exposure; All; HBCD; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3970760				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	US	
Metric 3:	Applicability	Unacceptable	4	Toxicity information is relevant to the Risk Assessment, but is not utilized by the engineering assessors	
Metric 4:	Temporal Representativeness	Acceptable	3	2016	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination *		Unacceptable	4.0		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Worker Activity:		Provides toxicity data on HBCD. No information extracted.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Niosh,. 2014. International chemical safety cards (ICDC): Hexabromocyclododecane (mixture of isomers).				
Data Type	Exposure; All; HBCD; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3978153				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	US	
Metric 3:	Applicability	Unacceptable	4	No information regarding HBCD	
Metric 4:	Temporal Representativeness	Acceptable	3	2016	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination *		Unacceptable	4.0		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Worker Activity:		Provides toxicity and other SDS data on HBCD. No information extracted.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2017. Guidance on safe use: hexabromocyclododecane.				
Data Type	Exposure; All; HBCD; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3970743				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	US	
Metric 3:	Applicability	Unacceptable	4	Toxicity information is relevant to the Risk Assessment, but is not utilized by the engineering assessors	
Metric 4:	Temporal Representativeness	Acceptable	3	No Date (cites a soucce from 2006)	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination *		Unacceptable	4.0		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Worker Activity:		Provides toxicity and other SDS data on HBCD. No information extracted.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2009. Data on manufacture, import, export, uses and releases of HBCDD as well as information on potential alternatives to its use.				
Data Type	Exposure; All; All; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3809166				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Multiple European countries	
Metric 3:	Applicability	Acceptable	3	Provides infomration on both in-scope and out of scope uses.	
Metric 4:	Temporal Representativeness	Acceptable	3	2009	
Metric 5:	Sample Size	Acceptable	3	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	discussion of variability or uncertainty	
Overall Quality Determination*		High	1.4		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Type of Measurement or Method:		Presents exposure data that is presented in EURAR (HERO ID 3970747)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2009. Data on manufacture, import, export, uses and releases of HBCDD as well as information on potential alternatives to its use.				
Data Type	Exposure; Processing; MFG of XPS foam from XPS Masterbatch; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3809166				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Multiple European countries	
Metric 3:	Applicability	Acceptable	3	Provides infomration on both in-scope and out of scope uses.	
Metric 4:	Temporal Representativeness	Acceptable	3	2009	
Metric 5:	Sample Size	Acceptable	3	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	discussion of variability or uncertainty	
Overall Quality Determination*		High	1.4		
Extracted		Yes			
EXTRACTION					
Parameter	Data				
Exposure Concentration (Unit):	0.02 - 0.22 mg/3				
Number of Samples:	42				
Number of Sites:	4				
Type of Measurement or Method:	see Table 2.15				
Worker Activity:	Potential exposure to HBCDD during XPS manufacture occurs when it is added to a hopper that feeds into the polystyrene melt. Further potential exposure to HBCDDcontained within polystyrene dust may also occur during secondary processing of XPS and during the shredding and reprocessing of process waste.				

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Facility

Study Citation:	Thomsen, C.,Molander, P.,Daae, H. L.,Janák, K.,Froshaug, M.,Liane, V. H.,Thorud, S.,Becher, G.,Dybing, E.. 2007. Occupational exposure to hexabromocyclododecane at an industrial plant. Environmental Science and Technology.				
Data Type	Facility; Processing; Manufacture of EPS containing HBCD; Published Models for Exposures or Releases;				
Hero ID	787728				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	The model is free of mathematical errors and is based on scientifically sound approaches or methods.	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	A Scandanavian Industrial Plant. Since all scandinavian countries (Sweden, Denmark, Finland, Norway, Iceland) are in OECD, this score is a 2.	
Metric 3:	Applicability	Acceptable	3	EPS compounding not in scope but may provide insight into EPS particle size and wt frac	
Metric 4:	Temporal Representativeness	Acceptable	3	The report was published in 2007 (> 10 years ago)	
Metric 5:	Sample Size	N/A	N/A	Not applicable for models	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Some data is missing such as PV and batch size	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		Medium	2.0		
Extracted		Yes			
Parameter		EXTRACTION Data			
Process Description:		HBCD particles (from 20 nm to 2 mm) are added to EPS batches			
Number of Sites:		1			
Operating Days per Year and Batches per Day:		112 to 140 days/year (8-10 production periods; each production period lasts 14 days)			
Possible Physical Form:		Solid			
Chemical Concentration:		0.7 wt percent HBCD in EPS			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	ToxNet Hazardous Substances Data, Bank. 2017. HSDB: Hexabromocyclododecane.				
Data Type	Facility; Import; Manufacturing and importation of HBCD; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3970277				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	US	
Metric 3:	Applicability	Acceptable	3	Importation is in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2012	
Metric 5:	Sample Size	Acceptable	3	Information is from 3 CDR reporting sites, which represents only the sites exceeding the reporting threshold, so maybe not every possible site	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Report addresses CBI claims, but not much else	
Overall Quality Determination*		High	1.2		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Process Description:		See pg 90 for manufacturing description.			
Total Annual U.S. Volume (and percent of PV):		10 -50 million pounds			
Number of Sites:		3 - 2 import, 1 MFG (2012 CDR)			
Chemical Concentration:		40 to 100 percent in manufactured or imported substance			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Nicnas,. 2012. Priority existing chemical assessments: Hyexabromocyclododecane (HBCD)- PEC34.				
Data Type	Facility; Import; Importation of HBCD; Completed Exposure or Risk Assessments;				
Hero ID	3978355				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information collected from accepted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Australia	
Metric 3:	Applicability	Acceptable	3	Use in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2012	
Metric 5:	Sample Size	Acceptable	3	Infromation from limited number of outside sources	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Limited discussion on uncertainty and variability	
Overall Quality Determination*		High	1.3		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Process Description:		Liquid is imported in 200 kg drums or 20 kg steel drums to warehouse then to customers; No repackaging. Solid imported in 25 kg lined paper bags. Same for imported resins. [pg 44]			
Total Annual U.S. Volume (and percent of PV):		Australia = 0 for solid; 0.69 tonnes for liquid; 45 tonnes for EPS resin; 9.9 tonnes for XPS			
Possible Physical Form:		liquid; solid; EPS; XPS			
Chemical Concentration:		15-30 percent or 30-60 percent (liquid); 96-99.96 percent (solid); <1 percent (EPS); <3 percent (XPS)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Nicnas,. 2012. Priority existing chemical assessments: Hyexabromocyclododecane (HBCD)- PEC34.				
Data Type	Facility; Processing; Production of EPS resin; Completed Exposure or Risk Assessments;				
Hero ID	3978355				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information collected from accepted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Australia	
Metric 3:	Applicability	Acceptable	3	EPS compounding not in scope but may provide insight into EPS use rate	
Metric 4:	Temporal Representativeness	Acceptable	3	2012	
Metric 5:	Sample Size	Acceptable	3	Infromation from limited number of outside sources	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Limited discussion on uncertainty and variability	
Overall Quality Determination*		High	1.6		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Process Description:		See section 4.6.1 for detailed process description			
Total Annual U.S. Volume (and percent of PV):		>88 percent used for insulation (EPS and XPS)			
Number of Sites:		1			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Nicnas,. 2012. Priority existing chemical assessments: Hyexabromocyclododecane (HBCD)- PEC34.				
Data Type	Facility; Processing; Panels from EPS; Completed Exposure or Risk Assessments;				
Hero ID	3978355				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability	Metric 1: Methodology	Acceptable	3	Information collected from accepted sources	
Domain 2: Representative	Metric 2: Geographic Scope	Acceptable	3	Australia	
	Metric 3: Applicability	Acceptable	3	Use in scope	
	Metric 4: Temporal Representativeness	Acceptable	3	2012	
	Metric 5: Sample Size	Acceptable	3	Infromation from limited number of outside sources	
Domain 3: Accessibility/Clarity	Metric 6: Metadata Completeness	Acceptable	3	Information is all clearly cited	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Acceptable	3	Limited discussion on uncertainty and variability	
Overall Quality Determination*		High	1.3		
Extracted		Yes			
Parameter		EXTRACTION Data			
Process Description:		See section 4.6.1 for detailed process description. Moulded EPS blocks can be shaped at the building site, most often with a bandsaw, or they can be shaped in factories using hot wire cutting techniques.			
Total Annual U.S. Volume (and percent of PV):		>88 percent used for insulation (EPS and XPS)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Nicnas,. 2012. Priority existing chemical assessments: Hyexabromocyclododecane (HBCD)- PEC34.				
Data Type	Facility; Use; XPS Foam board; Completed Exposure or Risk Assessments;				
Hero ID	3978355				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information collected from accepted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Australia	
Metric 3:	Applicability	Acceptable	3	Use in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2012	
Metric 5:	Sample Size	Acceptable	3	Infromation from limited number of outside sources	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Limited discussion on uncertainty and variability	
Overall Quality Determination*		High	1.3		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Process Description:		Board dimensions are approximately 600 mm by 300 mm by 2400 mm. Boards are fixed in place by contractors using mechanical fasteners or adhesives. Some boards may be hand-cut to size and shape on-site.Insulated panels are typically clad with steel or aluminium sheet, adhesively bonded to the foam. [pg 45]			
Total Annual U.S. Volume (and percent of PV):		>88 percent used for insulation (EPS and XPS)			
Possible Physical Form:		solid - foam			
Chemical Concentration:		<3 percent			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High = ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Nicnas,. 2012. Priority existing chemical assessments: Hyexabromocyclododecane (HBCD)- PEC34.				
Data Type	Facility; Recycling; XPS Foam Recycling; Completed Exposure or Risk Assessments;				
Hero ID	3978355				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information collected from accepted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Australia	
Metric 3:	Applicability	Acceptable	3	Use in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2012	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Information is all clearly cited	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Limited discussion on uncertainty and variability	
Overall Quality Determination*		High	1.2		
Extracted		Yes			
Parameter		EXTRACTION Data			
Process Description:		A small percentage (<5 percent) is recovered for reuse at the end of a building’s life (estimated at 20 years) [pg 45].			
Possible Physical Form:		solid - foam			
Chemical Concentration:		<3 percent			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2014. Template for third party submission of information on alternatives for applications for authorisation HBCD use in EPS for building applications.				
Data Type	Facility; Processing; EPS Resin; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3970749				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Data from manufacturer, who is also the author of the report	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	EPS compounding not in scope but may provide insight into EPS wt frac and use rate	
Metric 4:	Temporal Representativeness	Acceptable	3	2014	
Metric 5:	Sample Size	Unacceptable	4	Qualitative	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Data sources are generally described but not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	The report does not address variability or uncertainty.	
Overall Quality Determination*		Medium	2.0		
Extracted		Yes			
<div>EXTRACTION</div>					
Parameter		Data			
Process Description:		HBCD is added to a 50/50 suspension of monomeric Styrene and water, together with other additives (catalysts, nucleation agents, etc.). HBCD dissolves in the styrene which is polymerized into the small Polystyrene beads. During polymerization a blowing agent is added.			
Total Annual U.S. Volume (and percent of PV):		HBCD demand (2015) = 2,200 metric ton			
Chemical Concentration:		0.5 percent -1.0 percent			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2014. Template for third party submission of information on alternatives for applications for authorisation HBCD use in EPS for building applications.			
Data Type	Facility; Processing; XPS Compounding / Masterbatch; Reports for Data or Information Other than Exposure or Release Data;			
Hero ID	3970749			
Domain	Metric	Rating	Score	Comments
Domain 1: Reliability				
Metric 1:	Methodology	Acceptable	3	Data from manufacturer, who is also the author of the report
Domain 2: Representative				
Metric 2:	Geographic Scope	Acceptable	3	Europe
Metric 3:	Applicability	Acceptable	3	Use in scope
Metric 4:	Temporal Representativeness	Acceptable	3	2014
Metric 5:	Sample Size	Unacceptable	4	Qualitative
Domain 3: Accessibility/Clarity				
Metric 6:	Metadata Completeness	Acceptable	3	Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty				
Metric 7:	Metadata Completeness	Unacceptable	4	The report does not address variability or uncertainty.
Overall Quality Determination *		Medium	1.8	
Extracted		Yes		
EXTRACTION				
Parameter	Data			
Process Description:	The XPS process makes use of a two-step extrusion process. It starts from polystyrene which is blended with the flame retardant in a first step and the addition of a blowing agent in a second step. Leaving the second extruder, the product expands into sheets which are cut in shape.			
Chemical Concentration:	1.5 -2.5 percent			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa., 2008. Risk assessment: hexabromocyclododecane.				
Data Type	Facility; Processing; EPS Resin; Completed Exposure or Risk Assessments;				
Hero ID	3970747				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information collected from accepted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Swedish Chemicals Agency	
Metric 3:	Applicability	Acceptable	3	EPS compounding not in scope but may provide insight into EPS use rate	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Unacceptable	4	Distribution characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination *		High	1.6		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Process Description:		Section 2.2.3.1			
Total Annual U.S. Volume (and percent of PV):		See Table 2-3 for European Value			
Number of Sites:		See Table 2-3 for European Value			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2008. Risk assessment: hexabromocyclododecane.				
Data Type	Facility; Processing; EPS Foam from Resin; Completed Exposure or Risk Assessments;				
Hero ID	3970747				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information collected from accepted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Swedish Chemicals Agency	
Metric 3:	Applicability	Acceptable	3	Use in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Unacceptable	4	Distribution characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.3		
Extracted		Yes			
Parameter		EXTRACTION Data			
Process Description:		Section 2.2.3.2			
Total Annual U.S. Volume (and percent of PV):		See Table 2-3 for European Value			
Number of Sites:		See Table 2-3 for European Value			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2008. Risk assessment: hexabromocyclododecane.			
Data Type	Facility; Processing; XPS Compounding / Masterbatch; Completed Exposure or Risk Assessments;			
Hero ID	3970747			
Domain	Metric	Rating	Score	Comments
Domain 1: Reliability				
Metric 1:	Methodology	Acceptable	3	Information collected from accepted sources
Domain 2: Representative				
Metric 2:	Geographic Scope	Acceptable	3	Swedish Chemicals Agency
Metric 3:	Applicability	Acceptable	3	Use in scope
Metric 4:	Temporal Representativeness	Acceptable	3	2008
Metric 5:	Sample Size	Unacceptable	4	Distribution characterized by no statistics.
Domain 3: Accessibility/Clarity				
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty				
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.
Overall Quality Determination *		High	1.3	
Extracted		Yes		
EXTRACTION				
Parameter		Data		
Process Description:		Section 2.2.4.1		
Total Annual U.S. Volume (and percent of PV):		See Table 2-3 for European Value		
Number of Sites:		See Table 2-3 for European Value		

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2008. Risk assessment: hexabromocyclododecane.				
Data Type	Facility; Processing; Production of XPS articles; Completed Exposure or Risk Assessments;				
Hero ID	3970747				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information collected from accepted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Swedish Chemicals Agency	
Metric 3:	Applicability	Acceptable	3	Use in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Unacceptable	4	Distribution characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.3		
Extracted		Yes			
Parameter		EXTRACTION Data			
Process Description:		Section 2.2.4.2			
Total Annual U.S. Volume (and percent of PV):		See Table 2-3 for European Value			
Number of Sites:		See Table 2-3 for European Value			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2017. Chemical safety report: Hexabromocyclododecane and all major diastereoisomers identified.				
Data Type	Facility; Processing; EPS articles from beads; Completed Exposure or Risk Assessments;				
Hero ID	3970748				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information collected from accepted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Use in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2009?	
Metric 5:	Sample Size	Unacceptable	4	Distribution characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination *		High	1.3		
Extracted		Yes			
Parameter		EXTRACTION Data			
Process Description:		EPS pellets are converted to expanded beads using steam. The expanded beads can then be moulded into boards and shapes (e.g. insulation boards). The temperature softens the beads and the expansion of blowing agent they contain (i.e. pentane) causes the pellets/beads to expand up to 50 times their original size. More details in Section 9.3.1.1			
Total Annual U.S. Volume (and percent of PV):		10 percent of EU tonnage			
Operating Days per Year and Batches per Day:		?230 days/yr			
Site Daily Throughput:		?391 kg/day; ?90 tonnes/yr (of HBCDD, equivalent to approximately 13 000 tonnes EPS)			
Possible Physical Form:		Solid (within polymer matrix)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2017. Chemical safety report: Hexabromocyclododecane and all major diastereoisomers identified.				
Data Type	Facility; Processing; use of flame-retarded expanded polystyrene articles.; Completed Exposure or Risk Assessments;				
Hero ID	3970748				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability	Metric 1: Methodology	Acceptable	3	Information collected from accepted sources	
Domain 2: Representative	Metric 2: Geographic Scope	Acceptable	3	Europe	
	Metric 3: Applicability	Acceptable	3	Use in scope	
	Metric 4: Temporal Representativeness	Acceptable	3	sources are 2009 - 2012	
	Metric 5: Sample Size	Unacceptable	4	Distribution characterized by no statistics.	
Domain 3: Accessibility/Clarity	Metric 6: Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.3		
Extracted		Yes			
Parameter		EXTRACTION Data			
Process Description:		In construction applications, use of FR EPS reduces costs in transport, handling and overall construction time to insulate buildings.			
Total Annual U.S. Volume (and percent of PV):		20 percent of EU tonnage			
Operating Days per Year and Batches per Day:		250			
Site Daily Throughput:		3.2 kg/d; 0.8 t/a			
Possible Physical Form:		Solid (within polymer matrix)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2017. Chemical safety report: Hexabromocyclododecane and all major diastereoisomers identified, Part 2.				
Data Type	Facility; Processing; formulation of EPS beads; Completed Exposure or Risk Assessments;				
Hero ID	3970753				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	EPS compounding not in scope but may provide insight into EPS wt frac and use rate	
Metric 4:	Temporal Representativeness	Acceptable	3	2012	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination *		High	1.6		
Extracted		Yes			
Parameter		EXTRACTION Data			
Process Description:		The reactor content is heated (and stirred) and during polymerisation, pentane (the expansion agent) is added to the reactor under pressure, where it is absorbed in the polymer droplets. The HBCDD is incorporated as an integral and encapsulated component within the polymer matrix with uniform concentration throughout the bead. See additional detailed description in Section 9.2.			
Total Annual U.S. Volume (and percent of PV):		24 percent for EU			
Operating Days per Year and Batches per Day:		?330 days			
Site Daily Throughput:		?2.91 t/d; ?960 t/y			
Chemical Concentration:		0.70 percent			
Continued on next page					

– continued from previous page

Study Citation:	Echa,. 2017. Chemical safety report: Hexabromocyclododecane and all major diastereoisomers identified, Part 2.			
Data Type	Facility; Processing; formulation of EPS beads; Completed Exposure or Risk Assessments;			
Hero ID	3970753			
Domain	Metric	Rating	Score	Comments

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2009. Background document for hexabromocyclododecane and all major diastereoisomers identified.				
Data Type	Facility; Processing; formulation of EPS beads; Completed Exposure or Risk Assessments;				
Hero ID	3970750				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	EPS compounding not in scope but may provide insight into EPS wt frac and use rate	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination *		High	1.7		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Total Annual U.S. Volume (and percent of PV):		5,300 Tonnes/yr (EU)			
Number of Sites:		22			
Chemical Concentration:		0.70 percent			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2009. Background document for hexabromocyclododecane and all major diastereoisomers identified.				
Data Type	Facility; Processing; formulation of XPS; Completed Exposure or Risk Assessments;				
Hero ID	3970750				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability	Metric 1: Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative	Metric 2: Geographic Scope	Acceptable	3	Europe	
	Metric 3: Applicability	Acceptable	3	Use is in scope	
	Metric 4: Temporal Representativeness	Acceptable	3	2008	
	Metric 5: Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity	Metric 6: Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination*		High	1.4		
Extracted		Yes			
Parameter		EXTRACTION Data			
Total Annual U.S. Volume (and percent of PV):		5,900 Tonnes/yr (EU)			
Number of Sites:		56			
Chemical Concentration:		0.70 percent			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2009. Background document for hexabromocyclododecane and all major diastereoisomers identified.				
Data Type	Facility; Processing; EPS converting; Completed Exposure or Risk Assessments;				
Hero ID	3970750				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Use is in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2009	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination *		High	1.4		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Number of Sites:		600			
Chemical Concentration:		0.70 percent			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Ineos Styrenics. 2017. Analysis of alternatives: HBCDD use in EPS for building applications.				
Data Type	Facility; Processing; EPS bead production; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3970752				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	EPS compounding not in scope but may provide insight into EPS wt frac	
Metric 4:	Temporal Representativeness	Acceptable	3	Sources are 2003 or more recent	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination *		High	1.6		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Process Description:		There are two single-step processes, the suspension process and the mass process. The suspension process is described first in 2.1.1.1, with key differences in the mass process described in 2.1.1.2. HBCD pre-added to styrene or added to reactor during polymerization. An expansion agent, pentane, is added to the reactor during polymerisation (at a temperature of approximately 130oC) and is absorbed by the polymer droplets. EPS pellets formed and are dried.			
Chemical Concentration:		0.70 percent			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Ineos Styrenics. 2017. Analysis of alternatives: HBCDD use in EPS for building applications.				
Data Type	Facility; Processing; EPS foam from pellets; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3970752				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability	Metric 1: Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative	Metric 2: Geographic Scope	Acceptable	3	Europe	
	Metric 3: Applicability	Acceptable	3	Use is in scope	
	Metric 4: Temporal Representativeness	Acceptable	3	Sources are 2003 or more recent	
	Metric 5: Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity	Metric 6: Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Acceptable	3	Addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.4		
Extracted		Yes			
Parameter		EXTRACTION Data			
Process Description:		The EPS pellets are converted to expanded beads using steam. The expanded beads can then be moulded into boards and shapes (e.g. insulation boards, specific shapes for packaging). The steps are further described in Section 2.1.3.			
Chemical Concentration:		0.70 percent			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	U.S, E. P. A.. 2015. TSCA Work Plan chemical problem formulation and initial assessment. Cyclic aliphatic bromide cluster flame retardants.				
Data Type	Facility; Processing/Use; EPS boards; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3809277				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability	Metric 1: Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative	Metric 2: Geographic Scope	Acceptable	3	US	
	Metric 3: Applicability	Acceptable	3	Use is in scope	
	Metric 4: Temporal Representativeness	Acceptable	3	2012	
	Metric 5: Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity	Metric 6: Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Acceptable	3	Addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination *		High	1.2		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Process Description:		Used for interior insulation			
Total Annual U.S. Volume (and percent of PV):		45 percent			
Chemical Concentration:		0.5			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	U.S. E. P. A.. 2015. TSCA Work Plan chemical problem formulation and initial assessment. Cyclic aliphatic bromide cluster flame retardants.				
Data Type	Facility; Processing/Use; XPS boards; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3809277				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	US	
Metric 3:	Applicability	Acceptable	3	Use is in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2012	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.2		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Process Description:		XPS foam board is used mainly for roofing applications and architectural molding			
Total Annual U.S. Volume (and percent of PV):		51 percent			
Chemical Concentration:		0.5 to 1			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	U.S. E. P. A.. 2015. TSCA Work Plan chemical problem formulation and initial assessment. Cyclic aliphatic bromide cluster flame retardants.				
Data Type	Facility; Import; Importation of HBCD (not in articles); Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3809277				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	US	
Metric 3:	Applicability	Acceptable	3	Use is in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2012	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.2		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Total Annual U.S. Volume (and percent of PV):		92,270 pounds imported			
Number of Sites:		5 sites manufacture or import			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	U.S, E. P. A.. 2015. TSCA Work Plan chemical problem formulation and initial assessment. Cyclic aliphatic bromide cluster flame retardants.				
Data Type	Facility; Manufacture; Manufacture; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3809277				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	US	
Metric 3:	Applicability	Acceptable	3	Manufacture is not in scope but information could possibly be applied to import /repackaging	
Metric 4:	Temporal Representativeness	Acceptable	3	2012	
Metric 5:	Sample Size	Acceptable	3	characterized by a range with uncertain statistics	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.3		
Extracted		Yes			
Parameter		EXTRACTION Data			
Total Annual U.S. Volume (and percent of PV):		4.54E+06 to 2.29E+07 kg/yr			
Number of Sites:		3			
Operating Days per Year and Batches per Day:		250			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	U.S, E. P. A.. 2015. TSCA Work Plan chemical problem formulation and initial assessment. Cyclic aliphatic bromide cluster flame retardants.				
Data Type	Facility; Processing; EPS resin; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3809277				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	US	
Metric 3:	Applicability	Acceptable	3	EPS compounding not in scope but may provide insight into EPS use rate	
Metric 4:	Temporal Representativeness	Acceptable	3	2012	
Metric 5:	Sample Size	Acceptable	3	characterized by a range with uncertain statistics	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, as- sessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Addresses variability and uncertainty in the results. Uncer- tainty is well characterized.	
Overall Quality Determination*		High	1.3		
Extracted		Yes			
Parameter		EXTRACTION Data			
Total Annual U.S. Volume (and percent of PV):		2.043E+06 to 1.031E+07 kg/yr			
Number of Sites:		1 to 4			
Operating Days per Year and Batches per Day:		250			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	U.S, E. P. A.. 2015. TSCA Work Plan chemical problem formulation and initial assessment. Cyclic aliphatic bromide cluster flame retardants.				
Data Type	Facility; Processing; EPS converting; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3809277				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	US	
Metric 3:	Applicability	Acceptable	3	Use is in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2012	
Metric 5:	Sample Size	Acceptable	3	characterized by a range with uncertain statistics	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination *		High	1.1		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Total Annual U.S. Volume (and percent of PV):		2.043E+06 to 1.031E+07 kg/yr			
Number of Sites:		5 to 15			
Operating Days per Year and Batches per Day:		250			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	U.S, E. P. A.. 2015. TSCA Work Plan chemical problem formulation and initial assessment. Cyclic aliphatic bromide cluster flame retardants.				
Data Type	Facility; Processing; manufacture of XPS using HBCD powder (not masterbatch); Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3809277				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	US	
Metric 3:	Applicability	Acceptable	3	Use is in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2012	
Metric 5:	Sample Size	Acceptable	3	characterized by a range with uncertain statistics	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination *		High	1.1		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Total Annual U.S. Volume (and percent of PV):		2.316.E+06 to 1.168.E+07 kg/yr			
Number of Sites:		6 to 18			
Operating Days per Year and Batches per Day:		250			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	U.S, E. P. A.. 2015. TSCA Work Plan chemical problem formulation and initial assessment. Cyclic aliphatic bromide cluster flame retardants.				
Data Type	Facility; Processing; compounding of polystyrene resin to produce XPS masterbatch containing HBCD; Reports for Data or Information Other than Exposure				
Hero ID	3809277				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	US	
Metric 3:	Applicability	Acceptable	3	Use is in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2012	
Metric 5:	Sample Size	Acceptable	3	characterized by a range with uncertain statistics	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.1		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Total Annual U.S. Volume (and percent of PV):		2.316.E+06 to 1.168.E+07 kg/yr			
Number of Sites:		10 to 29			
Operating Days per Year and Batches per Day:		250			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	U.S, E. P. A.. 2015. TSCA Work Plan chemical problem formulation and initial assessment. Cyclic aliphatic bromide cluster flame retardants.				
Data Type	Facility; Processing; XPS converting; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3809277				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability	Metric 1: Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative	Metric 2: Geographic Scope	Acceptable	3	US	
	Metric 3: Applicability	Acceptable	3	Use is in scope	
	Metric 4: Temporal Representativeness	Acceptable	3	2012	
	Metric 5: Sample Size	Acceptable	3	characterized by a range with uncertain statistics	
Domain 3: Accessibility/Clarity	Metric 6: Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Acceptable	3	Addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination *		High	1.1		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Total Annual U.S. Volume (and percent of PV):		2.316.E+06 to 1.168.E+07 kg/yr			
Number of Sites:		10 to 24			
Operating Days per Year and Batches per Day:		250			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	. 2008. Summary risk assessment report: Hexabromocyclododecane.				
Data Type	Facility; Processing; Formulation of flame-retarded PS compound for XPS; Completed Exposure or Risk Assessments;				
Hero ID	3970756				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability	Metric 1: Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative	Metric 2: Geographic Scope	Acceptable	3	Europe	
	Metric 3: Applicability	Acceptable	3	Use is in scope	
	Metric 4: Temporal Representativeness	Acceptable	3	2008	
	Metric 5: Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity	Metric 6: Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination*		High	1.4		
Extracted		Yes			
Parameter		EXTRACTION Data			
Process Description:		taken from 2008 EU assessment (HERO 3970747)			
Total Annual U.S. Volume (and percent of PV):		1700 tons/yr			
Number of Sites:		>14			
Chemical Concentration:		40 percent in compound			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	. 2008. Summary risk assessment report: Hexabromocyclododecane.				
Data Type	Facility; Processing; Formulation of flame-retarded EPS beads; Completed Exposure or Risk Assessments;				
Hero ID	3970756				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	EPS compounding not in scope but may provide insight into EPS wt frac and use rate	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination*		High	1.7		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Process Description:		taken from 2008 EU assessment (HERO 3970747)			
Total Annual U.S. Volume (and percent of PV):		3400 tons/yr			
Number of Sites:		>18			
Chemical Concentration:		0.7 percent in EPS beads			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	. 2008. Summary risk assessment report: Hexabromocyclododecane.				
Data Type	Facility; Processing; Industrial use of EPS beads to produce flameretarded EPS; Completed Exposure or Risk Assessments;				
Hero ID	3970756				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Use is in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination *		High	1.4		
Extracted		Yes			
Parameter		EXTRACTION Data			
Process Description:		taken from 2008 EU assessment (HERO 3970747)			
Total Annual U.S. Volume (and percent of PV):		3400 tons/yr			
Number of Sites:		hundreds			
Chemical Concentration:		0.7 percent in foam			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	. 2008. Summary risk assessment report: Hexabromocyclododecane.			
Data Type	Facility; Processing; Industrial use of HBCDD in PS compound to produce flame-retarded XPS; Completed Exposure or Risk Assessments;			
Hero ID	3970756			
Domain	Metric	Rating	Score	Comments
Domain 1: Reliability				
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources
Domain 2: Representative				
Metric 2:	Geographic Scope	Acceptable	3	Europe
Metric 3:	Applicability	Acceptable	3	Use is in scope
Metric 4:	Temporal Representativeness	Acceptable	3	2008
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.
Domain 3: Accessibility/Clarity				
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty				
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion
Overall Quality Determination *		High	1.4	
Extracted		Yes		
EXTRACTION				
Parameter		Data		
Process Description:		taken from 2008 EU assessment (HERO 3970747)		
Total Annual U.S. Volume (and percent of PV):		1700 tons/yr		
Number of Sites:		17		
Chemical Concentration:		1 to 3 percent in foam		

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	. 2008. Summary risk assessment report: Hexabromocyclododecane.			
Data Type	Facility; Processing; Industrial use of HBCDD as powder to produce flame-retarded XPS; Completed Exposure or Risk Assessments;			
Hero ID	3970756			
Domain	Metric	Rating	Score	Comments
Domain 1: Reliability				
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources
Domain 2: Representative				
Metric 2:	Geographic Scope	Acceptable	3	Europe
Metric 3:	Applicability	Acceptable	3	Use is in scope
Metric 4:	Temporal Representativeness	Acceptable	3	2008
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.
Domain 3: Accessibility/Clarity				
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty				
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion
Overall Quality Determination*		High	1.4	
Extracted		Yes		
EXTRACTION				
Parameter		Data		
Process Description:		taken from 2008 EU assessment (HERO 3970747)		
Total Annual U.S. Volume (and percent of PV):		3200 tons/yr		
Number of Sites:		18		
Chemical Concentration:		0.5 to 3 percent in foam		

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2011. Proposal for identification of a substance as a CMR Cat 1 or 2, PBT, vPvB, or a substance of an equivalent level of concern: Proposal for identification of hexabromocyclododecane as a SVHC.				
Data Type	Facility; Use; EPS foam for construction; Completed Exposure or Risk Assessments;				
Hero ID	3970757				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Use is in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination*		High	1.4		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Process Description:		taken from 2008 EU assessment (HERO 3970747)			
Total Annual U.S. Volume (and percent of PV):		420,000 tonnes of EPS is used /yr; 170 000 of this is used in Eastern Europe (99 percent is flame retarded); 250 000 tonnes of EPS in Western (70 percent flame retarded)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2011. Proposal for identification of a substance as a CMR Cat 1 or 2, PBT, vPvB, or a substance of an equivalent level of concern: Proposal for identification of hexabromocyclododecane as a SVHC.				
Data Type	Facility; Processing; Formulation of flame-retarded PS compound for XPS; Completed Exposure or Risk Assessments;				
Hero ID	3970757				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Use is in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination*		High	1.4		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Process Description:		taken from 2008 EU assessment (HERO 3970747)			
Total Annual U.S. Volume (and percent of PV):		1700 tons/yr			
Number of Sites:		>14			
Chemical Concentration:		40 percent in compound			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2011. Proposal for identification of a substance as a CMR Cat 1 or 2, PBT, vPvB, or a substance of an equivalent level of concern: Proposal for identification of hexabromocyclododecane as a SVHC.				
Data Type	Facility; Processing; Formulation of flame-retarded EPS beads; Completed Exposure or Risk Assessments;				
Hero ID	3970757				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	EPS compounding not in scope but may provide insight into EPS wt frac and use rate	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination*		High	1.7		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Process Description:		taken from 2008 EU assessment (HERO 3970747)			
Total Annual U.S. Volume (and percent of PV):		3400 tons/yr			
Number of Sites:		>18			
Chemical Concentration:		0.7 percent in EPS beads			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2011. Proposal for identification of a substance as a CMR Cat 1 or 2, PBT, vPvB, or a substance of an equivalent level of concern: Proposal for identification of hexabromocyclododecane as a SVHC.				
Data Type	Facility; Processing; Industrial use of EPS beads to produce flameretarded EPS; Completed Exposure or Risk Assessments;				
Hero ID	3970757				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Use is in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination*		High	1.4		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Process Description:		taken from 2008 EU assessment (HERO 3970747)			
Total Annual U.S. Volume (and percent of PV):		3400 tons/yr			
Number of Sites:		hundreds			
Chemical Concentration:		0.7 percent in foam			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2011. Proposal for identification of a substance as a CMR Cat 1 or 2, PBT, vPvB, or a substance of an equivalent level of concern: Proposal for identification of hexabromocyclododecane as a SVHC.			
Data Type	Facility; Processing; Industrial use of HBCDD in PS compound to produce flame-retarded XPS; Completed Exposure or Risk Assessments;			
Hero ID	3970757			
Domain	Metric	Rating	Score	Comments
Domain 1: Reliability				
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources
Domain 2: Representative				
Metric 2:	Geographic Scope	Acceptable	3	Europe
Metric 3:	Applicability	Acceptable	3	Use is in scope
Metric 4:	Temporal Representativeness	Acceptable	3	2008
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.
Domain 3: Accessibility/Clarity				
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty				
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion
Overall Quality Determination*		High	1.4	
Extracted		Yes		
EXTRACTION				
Parameter	Data			
Process Description:	taken from 2008 EU assessment (HERO 3970747)			
Total Annual U.S. Volume (and percent of PV):	1700 tons/yr			
Number of Sites:	17			
Chemical Concentration:	1 to 3 percent in foam			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2011. Proposal for identification of a substance as a CMR Cat 1 or 2, PBT, vPvB, or a substance of an equivalent level of concern: Proposal for identification of hexabromocyclododecane as a SVHC.				
Data Type	Facility; Processing; Industrial use of HBCDD as powder to produce flame-retarded XPS; Completed Exposure or Risk Assessments;				
Hero ID	3970757				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Use is in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, as- sessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination*		High	1.4		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Process Description:		taken from 2008 EU assessment (HERO 3970747)			
Total Annual U.S. Volume (and percent of PV):		3200 tons/yr			
Number of Sites:		18			
Chemical Concentration:		0.5 to 3 percent in foam			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Nicnas,. 2001. Polybrominated flame retardants (PBFRs): Priority existing chemical assessment report no. 20.				
Data Type	Facility; Processing; XPS masterbatch; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	1443962				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	From trusted source	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Australia	
Metric 3:	Applicability	Acceptable	3	Information related to in-scope scenario	
Metric 4:	Temporal Representativeness	Acceptable	3	2001	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination*		High	1.4		
Extracted		Yes			
Parameter		EXTRACTION Data			
Process Description:		Formulation of resins containing the flame-retardant chemicals consists of weighing or pumping, mixing and blending, processing/extrusion and cutting and packaging of the granular pellets or liquid resins. The PBFRs are compounded with the appropriate polymer (polypropylene or polystyrene) to produce a masterbatch containing up to 30 percent of the flame-retardant. It is possible that more than one flame-retardant chemical may be used in the formulation process.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Nicnas,. 2001. Polybrominated flame retardants (PBFRs): Priority existing chemical assessment report no. 20.				
Data Type	Facility; Processing; Manufacture of XPS Using HBCD Powder; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	1443962				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	From trusted source	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Australia	
Metric 3:	Applicability	Acceptable	3	Information related to in-scope scenario	
Metric 4:	Temporal Representativeness	Acceptable	3	2001	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination *		High	1.4		
Extracted		Yes			
EXTRACTION					
Parameter	Data				
Continued on next page					

– continued from previous page

Study Citation:	Nicnas,. 2001. Polybrominated flame retardants (PBFRs): Priority existing chemical assessment report no. 20.			
Data Type	Facility; Processing; Manufacture of XPS Using HBCD Powder; Reports for Data or Information Other than Exposure or Release Data;			
Hero ID	1443962			
Domain	Metric	Rating	Score	Comments
Process Description:	In the blending plant, weighed amounts of the powdered or granulated polymeric material are transferred to rotary mixers/blenders. Weighing is a manual process, whereby workers transfer the flame retardant by tipping the drums or bags in specially designed dispensary. Weighed quantities of flame retardant, pigment and other additives are added either via a closed transfer system or through a chute with a vacuum collar or under local exhaust ventilation to remove dust.The blended material is discharged to a collection bin, usually either in an enclosed system or under local exhaust ventilation and transferred to an extruder, whereby the mixture is extruded under high temperatures to form strips, which are cooled then cut into small pellets or granules with the desired concentration of flame retardant. These are bagged and dispatched to customers.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Oecd,. 2015. Emission scenario document on use of adhesives.				
Data Type	Facility; Use; Adhesives; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3833136				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	From trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	OECD	
Metric 3:	Applicability	Unacceptable	4	out of scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2015	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, as- sessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Addresses variability and uncertainty in the results. Uncer- tainty is well characterized.	
Overall Quality Determination *		Unacceptable	4.0		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Process Description:		This is out of scope therefore no data extraction.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Oecd,. 2004. Emission scenario document on textile finishing.				
Data Type	Facility; Use; textile finishing; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3833120				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	From trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	OECD	
Metric 3:	Applicability	Unacceptable	4	out of scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2004	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination *		Unacceptable	4.0		
Extracted		Yes			
Parameter		EXTRACTION Data			
Process Description:		This is out of scope therefore no data extraction.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Oecd,. 2015. Emission scenario documents on coating industry (paints, lacquers and varnishes).				
Data Type	Facility; Use; Paints and coatings; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3833129				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	From trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	OECD	
Metric 3:	Applicability	Unacceptable	4	out of scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2009	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination *		Unacceptable	4.0		
Extracted		Yes			
Parameter		EXTRACTION			
		Data			
Process Description:		This is out of scope therefore no data extraction.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2009. Prioritisation and Annex XIV background information: hexbromocyclododecane.				
Data Type	Facility; Import; Import; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3970759				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted source (ECHA)	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Use is in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2007	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination*		High	1.7		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Process Description:		Net Imports. Not including imports in articles. In all products HBCDD is uniformly incorporated as an integral encapsulated component within the polymer matrix; however it is not bound to the matrix or transformed.			
Total Annual U.S. Volume (and percent of PV):		6,000 tonnes/yr (EU - 2007)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2009. Prioritisation and Annex XIV background information: hexbromocyclododecane.			
Data Type	Facility; Processing; EPS formulation; Reports for Data or Information Other than Exposure or Release Data;			
Hero ID	3970759			
Domain	Metric	Rating	Score	Comments
Domain 1: Reliability				
Metric 1:	Methodology	Acceptable	3	Information is from trusted source (ECHA)
Domain 2: Representative				
Metric 2:	Geographic Scope	Acceptable	3	Europe
Metric 3:	Applicability	Acceptable	3	EPS compounding not in scope but may provide insight into EPS wt frac and use rate
Metric 4:	Temporal Representativeness	Acceptable	3	2006
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.
Domain 3: Accessibility/Clarity				
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty				
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion
Overall Quality Determination *		Medium	1.9	
Extracted		Yes		
EXTRACTION				
Parameter		Data		
Total Annual U.S. Volume (and percent of PV):		5,301 tonnes per year (EU - 2006)		
Number of Sites:		21		

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa., 2009. Prioritisation and Annex XIV background information: hexbromocyclododecane.				
Data Type	Facility; Processing; XPS formulation; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3970759				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted source (ECHA)	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Use is in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2006	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination*		High	1.7		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Total Annual U.S. Volume (and percent of PV):		5,859 tonnes /yr (EU - 2006)			
Number of Sites:		28			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2009. Prioritisation and Annex XIV background information: hexbromocyclododecane.				
Data Type	Facility; Processing; XPS converting; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3970759				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted source (ECHA)	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Use is in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, as- sessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	limited discussion	
Overall Quality Determination *		High	1.4		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Number of Sites:		35			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	Pinfa., 2016. Recycling of plastics containing hazardous substances.				
Data Type	Facility; Recycling; Recycling EPS; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3982158				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	From trusted source	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	Recycling is in scope; however, this process operation is for recycling EPS with the intention of removing HBCD and not utilizing it as a FR.	
Metric 4:	Temporal Representativeness	Acceptable	3	2016	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination *		High	1.6		
Extracted		Yes			
<div>EXTRACTION</div>					
Parameter		Data			
Process Description:		(Recycling EPS by reomving HBCD; in EU, where HBCD is being regulated more stringently). A process exists to redissolve EPS and remove the HBCD. The report refers to the Solvolys process, noting issues with achieving the low levels of HBCD in the recycled polystyrene required by chemical regulation. Editor’s note: this process, now CreaSolve”, has been improved to achieve well below 100 ppm HBCD (the EU POP regulation limit).			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	European Flame Retardants, Association. 2015. Keeping fire in check an introduction to flame retardants used in transport applications.				
Data Type	Facility; Processing / Use; Compounding related to the manufacture of auto parts; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3986543				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Acceptable	3	From trusted source
Domain 2: Representative	Metric 2:	Geographic Scope	Acceptable	3	Europe
	Metric 3:	Applicability	Acceptable	3	Information related to in-scope scenario
	Metric 4:	Temporal Representativeness	Acceptable	3	Unknown, but cites sources as recent as 2013
	Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type
Domain 3: Accessibility/Clarity	Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty
Overall Quality Determination *		High	1.4		
Extracted		Yes			
EXTRACTION					
Parameter	Data				
Process Description:	On average, personal vehicles contain over 105 kg of plastics. Amount of plastics in cars was 16 percent in 2010. The ratio is expected to amount to 18 percent by the end of the decade. The average weight of a vehicle is predicted to decrease to 1,100 kg in 2020 as compared to the 1,400 kg level in 2010.				

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	European Brominated Flame Retardant Industry, Panel. 2008. EBFRIP statement RE UBA’s publication on brominated flame retardant.				
Data Type	Facility; Use; Demand in EU; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3986544				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Unacceptable	4	The assessment or report uses data or techniques that are not high quality or not sound science. This is a very biased commentary.	
Domain 2: Representative					
Metric 2:	Geographic Scope	Unacceptable	4	Europe	
Metric 3:	Applicability	Unacceptable	4	Includes out of scope uses and is not applicable to the US	
Metric 4:	Temporal Representativeness	Acceptable	3	2008	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		Unacceptable	4.0		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Total Annual U.S. Volume (and percent of PV):		9,600 tonnes a year in EU			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Remberger, M.,Sternbeck, J.,Palm, A.,Kaj, L.,Strömberg, K.,Brorström-Lundén, E.. 2004. The environmental occurrence of hexabromocyclododecane in Sweden. Chemosphere.				
Data Type	Facility; Import; HBCD (neat) import amount; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	1927826				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Data from trusted source (Products Register,Swedish National Chemicals Inspectorate)	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Sweden	
Metric 3:	Applicability	Acceptable	3	Information related to in-scope scenario	
Metric 4:	Temporal Representativeness	Acceptable	3	2004	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination *		Medium	1.8		
Extracted		Yes			
<div>EXTRACTION</div>					
Parameter		Data			
Process Description:		Net imports. Contains the total tons per year of HBCD imported to Sweden from 1993 to 2000			
Total Annual U.S. Volume (and percent of PV):		5 -120 tons HBCD per year (Sweden)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Remberger, M.,Sternbeck, J.,Palm, A.,Kaj, L.,Strömberg, K.,Brorström-Lundén, E.. 2004. The environmental occurrence of hexabromocyclododecane in Sweden. Chemosphere.				
Data Type	Facility; Use; EPS or XPS Foam; Completed Exposure or Risk Assessments;				
Hero ID	1927826				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Data from trusted source (Products Register,Swedish National Chemicals Inspectorate)	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Sweden	
Metric 3:	Applicability	Acceptable	3	Information related to in-scope scenario	
Metric 4:	Temporal Representativeness	Acceptable	3	2004	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination *		Medium	1.8		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Process Description:		Amount used per year in EU according to an EU Risk Assessment (The Chemical Inspectorate (KEMI), 2002)			
Total Annual U.S. Volume (and percent of PV):		10,000 tons HBCD per year (85 percent of total used in EU)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Remberger, M.,Sternbeck, J.,Palm, A.,Kaj, L.,Strömberg, K.,Brorström-Lundén, E.. 2004. The environmental occurrence of hexabromocyclododecane in Sweden. Chemosphere.				
Data Type	Facility; Use; Polymer matrices for cotton or cotton containing textile matrices; Completed Exposure or Risk Assessments;				
Hero ID	1927826				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Data from trusted source (Products Register,Swedish National Chemicals Inspectorate)	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Sweden	
Metric 3:	Applicability	Unacceptable	4	Textiles are not in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2004	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination *		Unacceptable	4.0		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Process Description:		Amount used per year in EU according to an EU Risk Assessment (The Chemical Inspectorate (KEMI), 2002)			
Total Annual U.S. Volume (and percent of PV):		1,000 tons HBCD per year (10 percent of total used in EU)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Remberger, M.,Sternbeck, J.,Palm, A.,Kaj, L.,Strömberg, K.,Brorström-Lundén, E.. 2004. The environmental occurrence of hexabromocyclododecane in Sweden. Chemosphere.				
Data Type	Facility; Use; HIPS (plastics for electronic devices); Completed Exposure or Risk Assessments;				
Hero ID	1927826				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Data from trusted source (Products Register,Swedish National Chemicals Inspectorate)	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Sweden	
Metric 3:	Applicability	Unacceptable	4	HIPS are not in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2004	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination *		Unacceptable	4.0		
Extracted		Yes			
Parameter		EXTRACTION Data			
Process Description:		Amount used per year in EU according to an EU Risk Assessment (The Chemical Inspectorate (KEMI), 2002)			
Total Annual U.S. Volume (and percent of PV):		600 tons HBCD per year (5 percent of total used in EU)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Rauert, C.,Lazarov, B.,Harrad, S.,Covaci, A.,Stranger, M.. 2014. A review of chamber experiments for determining specific emission rates and investigating migration pathways of flame retardants. Atmospheric Environment.				
Data Type	Facility; Manufacture; HBCD; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	2343745				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	UK	
Metric 3:	Applicability	Unacceptable	4	Manufacture is not in scope and this information is not applicable to in-scope scenarios	
Metric 4:	Temporal Representativeness	Acceptable	3	2013	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		Unacceptable	4.0		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Process Description:		Amount manufactured annually in Canada, Netherlands, and UK for years 1996 to 2003			
Total Annual U.S. Volume (and percent of PV):		Canada - 16,700 to 22,000 metric tons/yrNetherlands - 500 to 7,000 metric tons/yrUK - 1,000 to 5,000 metric tons/yr			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	La Guardia, M. J.,Hale, R. C.,Harvey, E.,Mainor, T. M.,Ciparis, S.. 2012. In situ accumulation of HBCD, PBDEs, and several alternative flame-retardants in the bivalve (<i>Corbicula fluminea</i>) and gastropod (<i>Elimia proxima</i>). Environmental Science and Technology.				
Data Type	Facility; Manufacture; Manufacture/import; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	1927601				
Domain	Metric		Rating	Score	Comments
Domain 1: Reliability					
	Metric 1:	Methodology	Acceptable	3	Information is from trusted sources
Domain 2: Representative					
	Metric 2:	Geographic Scope	Acceptable	3	US
	Metric 3:	Applicability	Acceptable	3	Manufacture is not in scope but information could possibly be applied to import
	Metric 4:	Temporal Representativeness	Acceptable	3	2012
	Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.
Domain 3: Accessibility/Clarity					
	Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty					
	Metric 7:	Metadata Completeness	Acceptable	3	limited discussion
Overall Quality Determination*			High	1.7	
Extracted			Yes		
			EXTRACTION		
Parameter			Data		
Process Description:			Note that this journal article measured HBCD concentrations in sediment and organisms at and downstream of a WWTP. Thus, no other data was extracted.		
Total Annual U.S. Volume (and percent of PV):			4535 and 22 679 tonnes in US (2006)		

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Janák, K.,Covaci, A.,Voorspoels, S.,Becher, G.. 2005. Hexabromocyclododecane in marine species from the Western Scheldt Estuary: diastereoisomer- and enantiomer-specific accumulation. Environmental Science and Technology.				
Data Type	Facility; Use; all polystyrene and textile applications; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	1927813				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Netherlands	
Metric 3:	Applicability	Acceptable	3	Contains both in-scope and out of scope uses	
Metric 4:	Temporal Representativeness	Acceptable	3	2001-2005	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	well characterized	
Overall Quality Determination*		Medium	1.8		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Process Description:		Note that this journal article measured HBCD concentrations in fish at a dutch estuary. Thus, no other data was extracted.			
Total Annual U.S. Volume (and percent of PV):		16 700 tons World demand (2001)			
Chemical Concentration:		0.8 - 4 percent			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Rani, M.,Shim, W. J.,Han, G. M.,Jang, M.,Song, Y. K.,Hong, S. H.. 2014. Hexabromocyclododecane in polystyrene based consumer products: An evidence of unregulated use. Chemosphere.				
Data Type	Facility; Use; EPS and XPS foam; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	2343697				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Korea	
Metric 3:	Applicability	Acceptable	3	in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2014	
Metric 5:	Sample Size	Acceptable	3	Study contains all concentration sampling data results, from which statistics can be surmised	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	well characterized	
Overall Quality Determination*		High	1.1		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Total Annual U.S. Volume (and percent of PV):		23000 tons worldwide			
Possible Physical Form:		foam			
Chemical Concentration:		EPS construction materials = 785181 " 27530 ng/g (i.e., 0.08 percent HBCD w/w); XPS construction = 190.7 " 100 ng g 1 (i.e., 2E-04 percent HBCD w/w)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Takigami, H.,Watanabe, M.,Kajiwara, N.. 2014. Destruction behavior of hexabromocyclododecanes during incineration of solid waste containing expanded and extruded polystyrene insulation foams. Chemosphere.				
Data Type	Facility; Use; EPS and XPS foam; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	2343703				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Japan	
Metric 3:	Applicability	Acceptable	3	in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2014	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	well characterized	
Overall Quality Determination *		High	1.3		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Total Annual U.S. Volume (and percent of PV):		80-90 percent of 31000 metric tonnes worldwide (2011)			
Chemical Concentration:		0.7 percent (EPS) and 2.5 percent (XPS)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Zhang, Y.,Li, Q.,Lu, Y.,Jones, K.,Sweetman, A. J.. 2016. Hexabromocyclododecanes (HBCDDs) in surface soils from coastal cities in North China: Correlation between diastereoisomer profiles and industrial activities. Chemosphere.				
Data Type	Facility; Use; EPS and XPS foam; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3350489				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Unacceptable	4	China	
Metric 3:	Applicability	Acceptable	3	in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2011	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	well characterized	
Overall Quality Determination *		High	1.4		
Extracted		Yes			
Parameter		EXTRACTION Data			
Process Description:		Note this source only contains concentrations of HBCD in selected soil samples			
Total Annual U.S. Volume (and percent of PV):		12,000 of 18,000 tons (2011 China)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Oecd,. 2007. SIDS initial assessment profile: Hexabromocyclododecane (HBCDD).			
Data Type	Facility; Manufacture; Manufacture / import; Reports for Data or Information Other than Exposure or Release Data;			
Hero ID	3809146			
Domain	Metric	Rating	Score	Comments
Domain 1: Reliability				
Metric 1:	Methodology	Acceptable	3	SIDS profiles are a trusted source
Domain 2: Representative				
Metric 2:	Geographic Scope	Acceptable	3	SIDS profiles are prepared by OECD nations. US did not prepare this SIDS profile.
Metric 3:	Applicability	Acceptable	3	Manufacture is not in scope but information could possibly be applied to import
Metric 4:	Temporal Representativeness	Acceptable	3	2007
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.
Domain 3: Accessibility/Clarity				
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.
Domain 4: Variability and Uncertainty				
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty
Overall Quality Determination *		Medium	2.2	
Extracted		Yes		
EXTRACTION				
Data				
Parameter				
Total Annual U.S. Volume (and percent of PV):		6,000 tonnes/yr MFG; 5,000 tonnes imported (EU15 - 2005)		

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	Oecd,. 2007. SIDS initial assessment profile: Hexabromocyclododecane (HBCDD).			
Data Type	Facility; Use; EPS and XPS foam; Reports for Data or Information Other than Exposure or Release Data;			
Hero ID	3809146			
Domain	Metric	Rating	Score	Comments
Domain 1: Reliability				
Metric 1:	Methodology	Acceptable	3	SIDS profiles are a trusted source
Domain 2: Representative				
Metric 2:	Geographic Scope	Acceptable	3	SIDS profiles are prepared by OECD nations. US did not prepare this SIDS profile.
Metric 3:	Applicability	Acceptable	3	in scope
Metric 4:	Temporal Representativeness	Acceptable	3	2007
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.
Domain 3: Accessibility/Clarity				
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.
Domain 4: Variability and Uncertainty				
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty
Overall Quality Determination *		Medium	2.0	
Extracted		Yes		
EXTRACTION				
Data				
Total Annual U.S. Volume (and percent of PV):		88 percent in EU used for EPS and XPS		

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Yi, S.,Liu, J. G.,Jin, J.,Zhu, J.. 2016. Assessment of the occupational and environmental risks of hexabromocyclododecane (HBCD) in China. Chemosphere.				
Data Type	Facility; Manufacture; HBCD Production; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3350493				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Unacceptable	4	China	
Metric 3:	Applicability	Unacceptable	4	Manufacture is not in scope and this information is not applicable to in-scope scenarios	
Metric 4:	Temporal Representativeness	Acceptable	3	2016	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination *		Unacceptable	4.0		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Process Description:		Consists of large, medium, and small HBCD production plants			
Number of Sites:		14			
Operating Days per Year and Batches per Day:		5-10 bt/day			
Site Daily Throughput:		6,000 to 7,500 tonnes/annum			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Yi, S.,Liu, J. G.,Jin, J.,Zhu, J.. 2016. Assessment of the occupational and environmental risks of hexabromocyclododecane (HBCD) in China. Chemosphere.				
Data Type	Facility; Processing; XPS formulation; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3350493				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Unacceptable	4	China	
Metric 3:	Applicability	Acceptable	3	in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2016	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		Medium	1.9		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Process Description:		Consists of XPS flame retardant plants			
Number of Sites:		520			
Site Daily Throughput:		1,500 to 1,900 t/a (not sure what these units are)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Yi, S.,Liu, J. G.,Jin, J.,Zhu, J.. 2016. Assessment of the occupational and environmental risks of hexabromocyclododecane (HBCD) in China. Chemosphere.				
Data Type	Facility; Processing; EPS formulation; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3350493				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Unacceptable	4	China	
Metric 3:	Applicability	Unacceptable	4	EPS compounding not in scope and this information does not seem applicable to in-scope scenarios	
Metric 4:	Temporal Representativeness	Acceptable	3	2016	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination *		Unacceptable	4.0		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Process Description:		Consists of EPS flame retardant plants			
Number of Sites:		65			
Site Daily Throughput:		50,000 t/a (not sure what these units are)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Nie, Z.,Yang, Z.,Fang, Y.,Yang, Y.,Tang, Z.,Wang, X.,Die, Q.,Gao, X.,Zhang, F.,Wang, Q.,Huang, Q.. 2015. Environmental risks of HBCDD from construction and demolition waste: a contemporary and future issue. Environmental Science and Pollution Research.				
Data Type	Facility; Recycling; EPS and XPS foam; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3350517				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	EU	
Metric 3:	Applicability	Acceptable	3	in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2015	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		Medium	1.8		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Process Description:		Review of several soruces with information about HBCD in construction and demolition waste all over the world. Does not provide much novel information, just a review of other industry data.			
Total Annual U.S. Volume (and percent of PV):		Indicates that 30 percent of EPS and XPS foam is recycled in the EU (source dated 2011			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Morose, G.. 2006. An overview of alternatives to tetrabomobisphenol A (TBBPA) and hexabromocyclododecane (HBCD).				
Data Type	Facility; Use; HBCD Global Market Demand; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3809151				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	US	
Metric 3:	Applicability	Acceptable	3	Contains both in-scope and out of scope uses	
Metric 4:	Temporal Representativeness	Acceptable	3	2006	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		Medium	2.1		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Process Description:		Brominated flame redardant global market demand			
Total Annual U.S. Volume (and percent of PV):		16,700 metric tonnes globally in 2001 (2,800 metric tonnes in Americas in 2001)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	U.S, E. P. A.. 2017. Preliminary information on manufacturing, processing, distribution, use, and disposal: Cyclic aliphatic bromide cluster (HBCD).				
Data Type	Facility; Import/Processing/Use; All lifecycle stages; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3827330				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	US	
Metric 3:	Applicability	Acceptable	3	in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2017	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	well characterized	
Overall Quality Determination *		High	1.0		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Process Description:		Support document created for the docket by EPA’s OCSPP in 2017. Provides a general discussion on the life cycle of HBCD in the U.S.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	. 2004. Kirk-Othmer Encyclopedia of Chemical Technology.				
Data Type	Facility; Manufacture; Manufacture of HBCD; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3859418				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	US	
Metric 3:	Applicability	Unacceptable	4	Manufacture is not in scope and this information is not applicable to in-scope scenarios	
Metric 4:	Temporal Representativeness	Acceptable	3	2004	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		Unacceptable	4.0		
Extracted		Yes			
Parameter		EXTRACTION Data			
Process Description:		List of producers of HBCD is provided: Albermarle (US), DSBG (Israel), Great Lakes (US), ISC Chemicals, Ltd. (UK)			
Number of Sites:		4			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Mack, A. G.. 2004. Flame retardants, halogenated.				
Data Type	Facility; Manufacture; Manufacture of HBCD; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3859419				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	US	
Metric 3:	Applicability	Unacceptable	4	Manufacture is not in scope and this information is not applicable to in-scope scenarios	
Metric 4:	Temporal Representativeness	Acceptable	3	2004	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		Unacceptable	4.0		
Extracted		Yes			
EXTRACTION					
Data					
Process Description:		List of producers and trade names of HBCD is provided			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Ashford, R. D.. 2001. Ashford’s Dictionary of Industrial ChemicalsHexabromocyclododecane.				
Data Type	Facility; All; HBCD; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3860436				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	UK	
Metric 3:	Applicability	Acceptable	3	Physical properties are applicable to in scope uses	
Metric 4:	Temporal Representativeness	Acceptable	3	2001	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		Medium	1.9		
Extracted		Yes			
Parameter		EXTRACTION Data			
Process Description:		Provides physical properties of HBCD			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	. 2017. Chemical data reporting: 1,2,5,6,9,10-hexabromo-cyclododecane.				
Data Type	Facility; Manufacture and import; Manufacture and import; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3860462				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	US	
Metric 3:	Applicability	Acceptable	3	import information is in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2017	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		High	1.5		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Process Description:		CDR data pulled from Chemview. Import site imports with HBCD never at import site.			
Total Annual U.S. Volume (and percent of PV):		CBI			
Number of Sites:		1 site MFG; 1 site Import			
Possible Physical Form:		Import site lists pellets as phys form. MFG site lists dry powder			
Chemical Concentration:		<1 percent in Building/Construction Materials			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	Pubchem,. 2017. PubChem: 1,2,5,6,9,10-Hexabromocyclododecane.				
Data Type	Facility; Manufacture; Manufacture of HBCD; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3970249				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	US	
Metric 3:	Applicability	Unacceptable	4	Manufacture is not in scope and this information is not applicable to in-scope scenarios	
Metric 4:	Temporal Representativeness	Acceptable	3	2010-2011	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		Unacceptable	4.0		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Process Description:		PubChem data pulled form the Open Chemistry Database for HBCD.			
Total Annual U.S. Volume (and percent of PV):		10 million to 50 million pounds in 2002			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Pubchem,. 2017. Pubchem Compound: Hexabromocyclododecane.				
Data Type	Facility; All; HBCD; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3970250				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	US	
Metric 3:	Applicability	Unacceptable	4	This information cannot be applied to any in-scope uses	
Metric 4:	Temporal Representativeness	Acceptable	3	2017	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination *		Unacceptable	4.0		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Process Description:		Search results for HBCD in Pubchem Compound. Identifies compounds with HBCD in the name but provides no extractable information.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2017. Hexabromocyclododecane.				
Data Type	Facility; All; HBCD; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3970735				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	UK	
Metric 3:	Applicability	Acceptable	3	Trade names may be usefull for background information sections in the risk evaluation	
Metric 4:	Temporal Representativeness	Acceptable	3	2017	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination *		High	1.6		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Process Description:		Search results of searching HBCD in ECHA and provides several trade names for HBCD.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	KemI,. 2009. Proposal for harmonised classification and labelling: Substance name: Hexabromocyclododecane.				
Data Type	Facility; Manufacture and import; Manufacture and import; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3970751				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Sweden	
Metric 3:	Applicability	Acceptable	3	Information is directly related to Import	
Metric 4:	Temporal Representativeness	Acceptable	3	2009	
Metric 5:	Sample Size	Acceptable	3	Wt fraction and PV provided in ranges with no other statistics	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	clearly documents its data sources	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Some discussion	
Overall Quality Determination*		High	1.3		
Extracted		Yes			
EXTRACTION					
Parameter	Data				
Total Annual U.S. Volume (and percent of PV):	Table 2-1 lists import and MFG volumes for multiple countries				
Possible Physical Form:	White odorless solid				
Chemical Concentration:	90-100 percent HBCD; impurities in HBCDD are usually less than 4 percent w/w.				

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2016. Annex XV report: An assessment of whether the use of HBCDD in articles should be restricted in accordance with Article 69(2) of reach.				
Data Type	Facility; Manufacture; Manufacture of HBCD; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3970758				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	EU	
Metric 3:	Applicability	Acceptable	3	Manufacture is not in scope but some info applies to import	
Metric 4:	Temporal Representativeness	Acceptable	3	2006-2007	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	clearly documents its data sources	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Some discussion	
Overall Quality Determination *		Medium	1.9		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Total Annual U.S. Volume (and percent of PV):		6,000 tonnes per year each MFG and imported in EU (2006/2007)			
Number of Sites:		35 notifications from both producers and importers of articles.			
Chemical Concentration:		amount of contaminants/unknown constituents varies (0-5 percent)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2016. Annex XV report: An assessment of whether the use of HBCDD in articles should be restricted in accordance with Article 69(2) of reach.				
Data Type	Facility; Processing; XPS compounding; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3970758				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	EU	
Metric 3:	Applicability	Acceptable	3	in scope	
Metric 4:	Temporal Representativeness	Acceptable	3	2006-2007	
Metric 5:	Sample Size	Unacceptable	4	characterized by no statistics.	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	clearly documents its data sources	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	Some discussion	
Overall Quality Determination*		High	1.7		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Total Annual U.S. Volume (and percent of PV):		Number of sites and use rates same as 3970759			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2017. Uses at industrial sites: hexabromocyclododecane.				
Data Type	Facility; Manufacturing/Processing/Use; HBCD; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3970762				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	EU	
Metric 3:	Applicability	Acceptable	3	This document is just a list of uses of HBCD. Some uses are in scope and some are out of scope.	
Metric 4:	Temporal Representativeness	Acceptable	3	No Date (cites a soucce from 2006)	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination *		Medium	2.1		
Extracted		Yes			
Parameter		EXTRACTION Data			
Process Description:		Provides a general list of the manufacturing, processing, and use operations that are performed using HBCD. Only provides a short description. No data was extracted.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2017. Uses by professional workers: hexabromocyclododecane.				
Data Type	Facility; All; HBCD; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3970763				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	EU	
Metric 3:	Applicability	Acceptable	3	This document is just a list of uses for HBCD articles. Some uses are in scope and some are out of scope.	
Metric 4:	Temporal Representativeness	Acceptable	3	No Date (cites a soucce from 2006)	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination *		Medium	2.1		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Process Description:		Provides a general list of potential uses for HBCD containing articles. Only provides a short descriptions. No data was extracted.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Acc., 2017. Flame retardants: Frequently asked questions: Safety regulations.				
Data Type	Facility; All; HBCD; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3978170				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources - American Chemistry Council	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	US	
Metric 3:	Applicability	Unacceptable	4	Not detailed enough to provide data in scope.	
Metric 4:	Temporal Representativeness	Unacceptable	4	No date	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination *		Unacceptable	4.0		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Process Description:		Fact sheet on some questions about flame redardants and HBCD in the U.S. No data was extracted.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Nicnas,. 2013. NICNAS: Hexabromocyclododecane (HBCD).				
Data Type	Facility; All; HBCD; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3978354				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	US	
Metric 3:	Applicability	Unacceptable	4	Not detailed enough to provide data in scope.	
Metric 4:	Temporal Representativeness	Acceptable	3	2013	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		Unacceptable	4.0		
Extracted		Yes			
Parameter		EXTRACTION Data			
Process Description:		Provides general background information.	No information was extracted.		

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Government of, Canada. 2016. Fact sheets & frequently asked questions: Cyclododecane, 1,2,5,6,9,10-hexabromo-(hexabromocyclododecane; HBCD).				
Data Type	Facility; All; HBCD; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3978365				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Canada	
Metric 3:	Applicability	Unacceptable	4	Not detailed enough to provide data in scope.	
Metric 4:	Temporal Representativeness	Acceptable	3	2017	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination *		Unacceptable	4.0		
Extracted		Yes			
Parameter		EXTRACTION Data			
Process Description:		Fact sheet on how HBCD is used and assessed in Canada. No information was extracted.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Xpsa,. . XPSA white paper ” safety of FRs in energy-efficient XPS foam insulation.			
Data Type	Facility; Processing and Consumer Use; XPS Foam Insulation; Reports for Data or Information Other than Exposure or Release Data;			
Hero ID	3981024			
Domain	Metric	Rating	Score	Comments
Domain 1: Reliability				
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources
Domain 2: Representative				
Metric 2:	Geographic Scope	Acceptable	3	US
Metric 3:	Applicability	Unacceptable	4	Not detailed enough to provide data in scope.
Metric 4:	Temporal Representativeness	Acceptable	3	No Date (cites a soucce from 2013)
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type
Domain 3: Accessibility/Clarity				
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.
Domain 4: Variability and Uncertainty				
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty
Overall Quality Determination*		Unacceptable	4.0	
Extracted		Yes		
EXTRACTION				
Parameter		Data		
Process Description:		Fact sheet about using HBCD in XPS Foam Insulation written by the Extruded Polystyrene Foam Association. No information was extracted.		

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation: . 2012. XPS industry perspective on sustainability and environmental awareness.				
Data Type Facility; Processing and Consumer Use; XPS Foam Insulation; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID 3981025				
Domain	Metric	Rating	Score	Comments
Domain 1: Reliability				
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources
Domain 2: Representative				
Metric 2:	Geographic Scope	Acceptable	3	US
Metric 3:	Applicability	Unacceptable	4	Not detailed enough to provide data in scope.
Metric 4:	Temporal Representativeness	Acceptable	3	2012
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type
Domain 3: Accessibility/Clarity				
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.
Domain 4: Variability and Uncertainty				
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty
Overall Quality Determination*		Unacceptable	4.0	
Extracted		Yes		
EXTRACTION				
Parameter		Data		
Process Description:		Fact sheet about using HBCD in XPS Foam Insulation written by the Extruded Polystyrene Foam Association. No information was extracted.		

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	Spin,. 2017. SPIN substances in preparations in nordic countries cyclododecane, 1, 2, 5, 6, 9, 10-hexabromo.				
Data Type	Facility; All; HBCD; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3981131				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Sweden, Norway, Denmark, and Finland	
Metric 3:	Applicability	Acceptable	3	This document includes all uses of HBCD. Some uses are in scope and some are out of scope.	
Metric 4:	Temporal Representativeness	Acceptable	3	2017	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination *		Medium	1.9		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Process Description:		A database for nordic countries HBCD use over the years in several life cycle stages. Note that most of the info is confidential.			
Total Annual U.S. Volume (and percent of PV):		3 to 200.4 tonnes per year (in nordic countries - Finland, Denmark, Sweden, and Norway)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	European Flame Retardants, Association. 2006. Flame retardants fact sheet hexabromocyclododecane.				
Data Type	Facility; All; HBCD; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3981169				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe (Belgium)	
Metric 3:	Applicability	Unacceptable	4	Not detailed enough to provide data in scope.	
Metric 4:	Temporal Representativeness	Acceptable	3	2006	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination *		Unacceptable	4.0		
Extracted		Yes			
<div>EXTRACTION</div>					
Parameter		Data			
Process Description:		Fact sheet on how HBCD is used and assessed in the EU. No information was extracted.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	European Flame Retardants, Association. 2016. EFRA members portal Private Transport.				
Data Type	Facility; All; HBCD; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3981173				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Unacceptable	4	Not detailed enough to provide data in scope.	
Metric 4:	Temporal Representativeness	Acceptable	3	2017	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination *		Unacceptable	4.0		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Process Description:		Fact sheet about the transportation industry sectors that use several different flame retardants (including HBCD) in transport applications. No information was extracted.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	European Flame Retardants, Association. 2016. EFRA members portal structural elements.				
Data Type	Facility; All; HBCD; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3981174				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Unacceptable	4	Not detailed enough to provide data in scope.	
Metric 4:	Temporal Representativeness	Acceptable	3	2017	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		Unacceptable	4.0		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Process Description:		Fact sheet about the use of flame retardants (including HBCD) in structural elements (e.g., foam insulation, electronics). No information was extracted.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .

Study Citation:	European Brominated Flame Retardant Industry, Panel. 2008. ebfrp our substances, hexabromocyclododecane (HBCD).				
Data Type	Facility; All; HBCD; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3981176				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Unacceptable	4	Not detailed enough to provide data in scope.	
Metric 4:	Temporal Representativeness	Acceptable	3	2017	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		Unacceptable	4.0		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Process Description:		General discussion about the uses of HBCD. No information was extracted.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Fishbein, B. K.. 2002. Waste in the Wireless World: The Challenge of Cell PhonesChapter 3: The toxic content of cell phones and other electronic devices.				
Data Type	Facility; All; HBCD; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3982069				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Acceptable	3	This document includes all uses of HBCD. Some uses are in scope and some are out of scope.	
Metric 4:	Temporal Representativeness	Acceptable	3	2004	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		Medium	2.1		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Process Description:		Provides the 1999 Market Demand for HBCD in Europe, Americas, and Asia			
Total Annual U.S. Volume (and percent of PV):		Americas - 3,100 metric tons/yearEurope - 8,900 metric tons/yrAsia - 3,900 metric tons/yr (in 1999)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Pinfa., 2016. Correction to article pinfa newsletter no64 ' recycling of plastics containing hazardous substances'.				
Data Type	Facility; All; HBCD; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3982156				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Europe	
Metric 3:	Applicability	Unacceptable	4	Not detailed enough to provide data in scope.	
Metric 4:	Temporal Representativeness	Acceptable	3	2017	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination *		Unacceptable	4.0		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Process Description:		General discussion about the Phosphorous, Inorganic, & Nitrogen Flame Retardants Association. No information was extracted.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Pinfa,. 2010. Innovative and sustainable flame retardants in transportations, non-halogenated phosphorus, inorganic and nitrogen flame retardants.				
Data Type	Facility; All; HBCD; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3982171				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability	Metric 1: Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative	Metric 2: Geographic Scope	Acceptable	3	Europe (Belgium)	
	Metric 3: Applicability	Unacceptable	4	Not detailed enough to provide data in scope.	
	Metric 4: Temporal Representativeness	Acceptable	3	2010	
	Metric 5: Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity	Metric 6: Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination *		Unacceptable	4.0		
Extracted		Yes			
Parameter		EXTRACTION Data			
Process Description:		Report on the use of flame redardants in fire test, interior parts, textiles, seats, cables, and electronics. Comparison between halogenated and non-halogenated flame retardants. No information was extracted.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale: High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Structural Insulated Panel, Association. 2017. Expanded polystyrene flame retardants.				
Data Type	Facility; Processing; EPS formulation; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3982180				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability	Metric 1: Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative	Metric 2: Geographic Scope	Acceptable	3	Europe	
	Metric 3: Applicability	Unacceptable	4	Not detailed enough to provide data in scope.	
	Metric 4: Temporal Representativeness	Acceptable	3	2017	
	Metric 5: Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity	Metric 6: Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		Unacceptable	4.0		
Extracted		Yes			
Parameter		EXTRACTION Data			
Process Description:		Fact sheet on flame retardants used in EPS . No information was extracted.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Ipc,. 2007. RE: Norway’s prohibition on certain hazardous substances in consumer products; Norway notification number 2007/9016/N under EU 98/34 procedure.				
Data Type	Facility; All; HBCD; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3982413				
Domain	Metric		Rating	Score	Comments
Domain 1: Reliability					
	Metric 1:	Methodology	Acceptable	3	Information is from trusted sources
Domain 2: Representative					
	Metric 2:	Geographic Scope	Acceptable	3	Europe
	Metric 3:	Applicability	Unacceptable	4	Not detailed enough to provide data in scope.
	Metric 4:	Temporal Representativeness	Acceptable	3	2007
	Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type
Domain 3: Accessibility/Clarity					
	Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.
Domain 4: Variability and Uncertainty					
	Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty
Overall Quality Determination*			Unacceptable	4.0	
Extracted			Yes		
EXTRACTION					
Parameter			Data		
Process Description:			IPC (Association Connecting Electronics Industries) comments on Norway’s Prohibition on Certain Hazardous Substances in Consumer Products; Norway Notification Number 2007/9016/N under EU 98/34 Procedure		

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Sipa,. 2012. Technical bulletin no. 6: SIPs and HBCD flame retardants.				
Data Type	Facility; All; HBCD; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3982469				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	US	
Metric 3:	Applicability	Unacceptable	4	Not detailed enough to provide data in scope.	
Metric 4:	Temporal Representativeness	Acceptable	3	2012	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		Unacceptable	4.0		
Extracted		Yes			
		EXTRACTION			
Parameter		Data			
Process Description:		Fact sheet about HBCD in the US and Canada. No information was extracted			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Jpma,. 2016. Washington state chemical update.				
Data Type	Facility; Use; HBCD in Children’s products; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3982479				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	US	
Metric 3:	Applicability	Unacceptable	4	Not detailed enough to provide data in scope.	
Metric 4:	Temporal Representativeness	Acceptable	3	2016	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		Unacceptable	4.0		
Extracted		Yes			
<div>EXTRACTION</div>					
Parameter		Data			
Process Description:		News article about the restriction of HBCD in children’s products in Washington state. No information was extracted.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Orn, U.,Bergman, A.. 2004. An attempt to assess the present commercial production of brominated flame retardants.				
Data Type	Facility; All; HBCD; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3986477				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Sweden	
Metric 3:	Applicability	Unacceptable	4	Not detailed enough to provide data in scope.	
Metric 4:	Temporal Representativeness	Acceptable	3	2003	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination*		Unacceptable	4.0		
Extracted		Yes			
EXTRACTION					
Parameter		Data			
Process Description:		Provides a list of brominated flame retardants that are commercially available. No information was extracted.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation: . 2012. Burning Questions, ENFIRO 2-day workshop.					
Data Type Facility; All; HBCD; Reports for Data or Information Other than Exposure or Release Data;					
Hero ID 3986542					
Domain		Metric	Rating	Score	Comments
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Brussels	
Metric 3:	Applicability	Unacceptable	4	Not detailed enough to provide data in scope.	
Metric 4:	Temporal Representativeness	Acceptable	3	2012	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Unacceptable	4	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Unacceptable	4	No discussion of variability or uncertainty	
Overall Quality Determination *		Unacceptable	4.0		
Extracted		Yes			
————— EXTRACTION —————					
Parameter		Data			
Process Description:		Provides a compilation of abstracts from a flame retardant conference. Does not provide extractable information.			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium = ≥ 1.7 to < 2.4 ; Low = ≥ 2.4 to < 3 .

Study Citation:	Echa,. 2009. Data on manufacture, import, export, uses and releases of HBCDD as well as information on potential alternatives to its use.				
Data Type	Facility; All; HBCD; Reports for Data or Information Other than Exposure or Release Data;				
Hero ID	3809166				
Domain	Metric	Rating	Score	Comments	
Domain 1: Reliability					
Metric 1:	Methodology	Acceptable	3	Information is from trusted sources	
Domain 2: Representative					
Metric 2:	Geographic Scope	Acceptable	3	Multiple European countries	
Metric 3:	Applicability	Acceptable	3	Provides infomration on both in-scope and out of scope uses.	
Metric 4:	Temporal Representativeness	Acceptable	3	2009	
Metric 5:	Sample Size	N/A	N/A	This metric does not relate to this data type	
Domain 3: Accessibility/Clarity					
Metric 6:	Metadata Completeness	Acceptable	3	fully transparent.	
Domain 4: Variability and Uncertainty					
Metric 7:	Metadata Completeness	Acceptable	3	discussion of variability or uncertainty	
Overall Quality Determination *		High	1.4		
Extracted		Yes			
<div>EXTRACTION</div>					
Parameter		Data			
Process Description:		Provides process descriptions that are taken from the EURAR (HERO ID 3970747)			
Total Annual U.S. Volume (and percent of PV):		Provides european data on the market breakdown of HBCD use (Pages 2 - 3)			

* If any individual metrics are deemed Unacceptable, then the overall rating is also unacceptable. Otherwise, the overall rating is based on the following scale:
 High= ≥ 1 to < 1.7 ; Medium= ≥ 1.7 to < 2.4 ; Low= ≥ 2.4 to < 3 .